the OIL AND GAS JOURNAL

DECEMBER 10, 1956

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TANKERS...

Their status today, and their outlook for tomorrow

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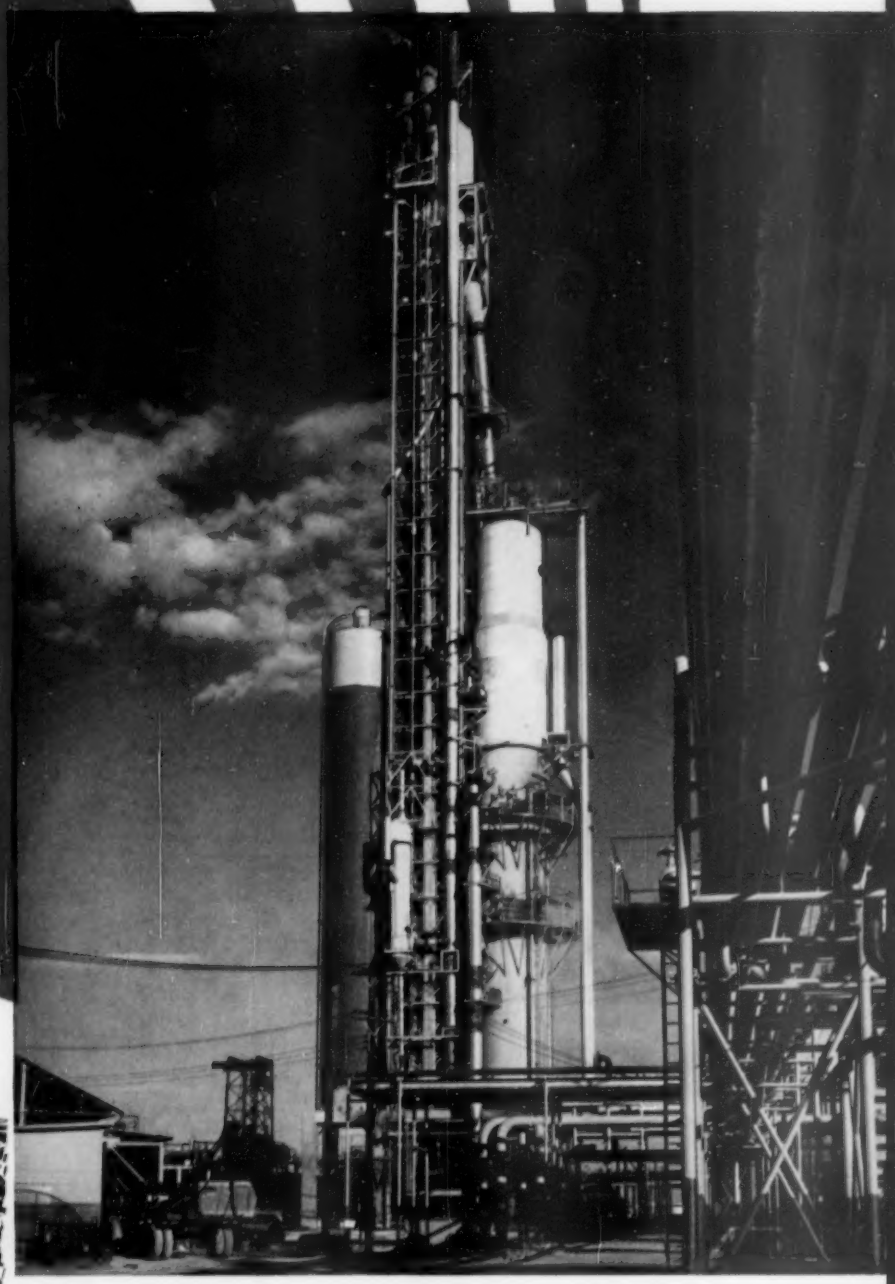
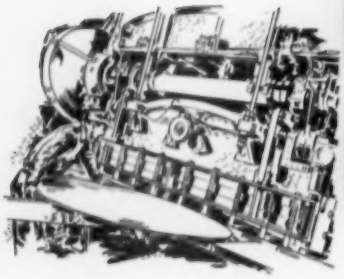
DESULFURIZING – 36 Per Cent of Refinery Runs by 1965. p. 109

THERE IS ALWAYS TOMORROW





• Whenever research comes up
with one process accomplishment,
it has opened the doors
to another score of possibilities.
For that reason Wyatt's facilities,
along with being adequate for today,
are always ready for tomorrow.

Wyatt's
HOUSTON-DALLAS-NEW YORK-TULSA

MANUFACTURERS AND ERECTORS SINCE 1913

A Glance Ahead . . . at press time

These trends will make TOMORROW'S NEWS

New wildcatting in the long-neglected Salina basin of Eastern Nebraska is in the cards for the near future. Magnetometer surveys in the last 15 months have led to location of at least four wildcats to granite, expected at about 2,700 ft. Tests are planned in Platte and Colfax counties.

Costs of finding new oil are still rising. One well-managed larger independent operating in the Mid-Continent says its costs are up nearly 25 cents per barrel this year just on investment in leases, drilling and lifting. This does not cover added costs of geological and seismic exploration work. These increases underscore the industry's constant warning that prices on domestic crude must rise in the future.

Nitrogen "rain" is the newest petrochemical application. Planes are being used to shower New Jersey tree farms with nitrogen pellets. The result of this experimental chemical fertilization from the air: Faster-growing pine trees in commercial lumber stands.

Well-head prices aren't being cut on natural gas sold to Trans-Canada pipeline. Negotiations are under way to change terms of purchase contracts, but they're due to an upset in the construction timetable caused by delays in pipe deliveries. Only contract changes are in gas-delivery schedules.

Gas pipelines are continuing the trend toward establishing their own exploration and production departments.

Trunkline Gas Co. recently formed the nucleus of a production department. Apparently following suit, Transcontinental Gas Pipe Line Corp. has hired an offshore expert from C.A.T.C. Offshore Group. The Gulf of Mexico is expected to be one of the main hunting grounds for pipeline companies.

New work in hydrocarbon extraction from tar sands will result from Sohio's recent acquisition of the Asphalt Ridge properties in Uintah County, Utah.

The company will do some exploration to determine the extent of the deposits. At the same time it will investigate extraction techniques in the lab. Later a pilot plant in the field is planned, if preliminary work indicates it is feasible.

Thermal diffusion may come into the picture for commercial production of high viscosity index oils. The process, proved in the laboratory, separates high VI from low VI components of lube oils. Ohio Standard plans to install a new pilot plant unit at its Cleveland research center to investigate this process further. It may reach the commercial stage for making specialty products some day.

Portable water-treating plants are being used by two West Coast companies so that they can more economically carry out pilot water floods. Skid mounted, the tanks, filters, and pumps can be moved from site to site, leaving only the concrete pads behind.

The OIL AND GAS JOURNAL

DECEMBER 10, 1956 • VOLUME 54 • NUMBER 84

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OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

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TECHNOLOGY—OPERATION

Refining-Processing

What's Ahead For Desulfurizing? **109**
By James Boyd Smith
Desulfurizing, or hydrogen treating, is due for a big increase in the next few years. About 10 per cent of total refinery runs will be desulfurized by January 1, 1957. This will jump to 32 per cent in 1960 and 36 per cent by 1965.

Vacuum-Tower Overhead Gets a Cleaning **111**
By Larry Resen
Water removal via electrical precipitation at Eastern States Houston plant makes possible increased steam-stripping rate and ups output of virgin gas oil.

On The Job . . . In The Plants **124**

Prefab Wall Makes Two Cooling Ponds of One **136**
By Larry Resen
Cosden installed a cooling-pond wall at its Big Spring, Tex., refinery without shutting down the cooling tower or draining the pond. Small pond eases treating problem; large pond is reservoir.

The Foreman's Page **143**

Field Processing **147**

Drilling-Production

Field Processing—23: Control of Low-Temperature Systems **112**
By Dr. John M. Campbell

New Drilling Mud Scores on Four Counts **118**
By J. L. Lummus and B. V. Randall
This new oil-base mud can be economically mixed with rig equipment, using either crude or refined oil. It has improved properties and is versatile in use.

Air Drilling Falls Short **122**
By J. O. Scott
Water seepage has greatly reduced effectiveness of air drilling in Bird Creek field north of Tulsa. Air has failed to save any time over mud drilling and coring. Higher air pressures and more air appear needed.

What's Ahead for Automatic Custody Transfer? **129**
By H. C. Packard, Harold S. Kelly, and A. N. Newberg
Changed thinking about lease automatic custody transfer has resulted in favorable climate for its development. Producers like it, while pipeliners take conservative viewpoint.

On The Job . . . In The Fields **139**
New portable base fits any type of pumping unit—mud-storage house saves labor—visible reservoir gives pumper accurate gage.

Modern Drilling **145**

Pipelining

Weight Coating Applied to Pipelines by Extrusion **114**
By Larry Resen
A high-density rubberized asphalt mastic coating has been applied by an extrusion process on 28 miles of pipe for Southern Natural Gas Co. near Lafitte, La. Specially designed equipment was mounted aboard a lay barge.

What's Ahead for Automatic Custody Transfer? **129**

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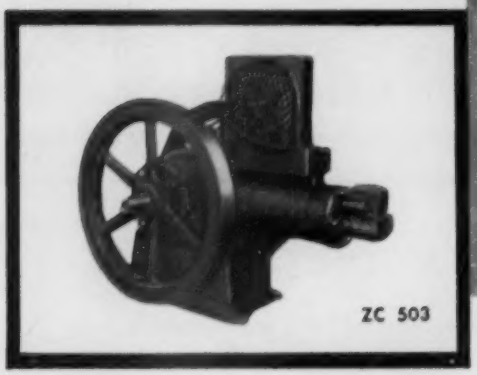
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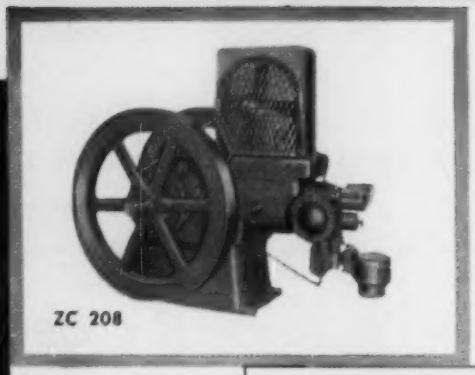
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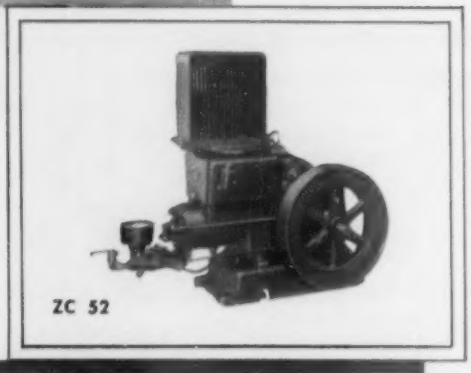
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pick a "ZC" that best fits your pumping unit!

The broad Fairbanks-Morse "ZC" line has an engine that will best fit your pumping unit . . . from 3 to 30 hp. They're economical and easy to maintain—simply designed with no complicated parts or delicate adjustments.

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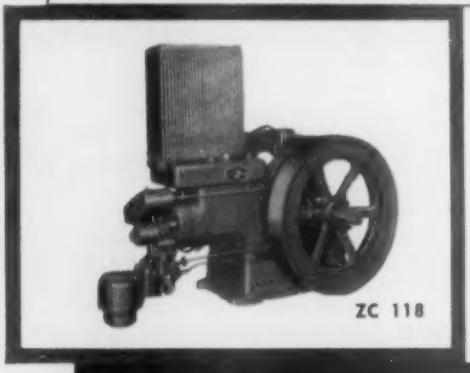
See your local supply store about the "ZC" line . . . or write Fairbanks, Morse & Co., Chicago 5, Illinois.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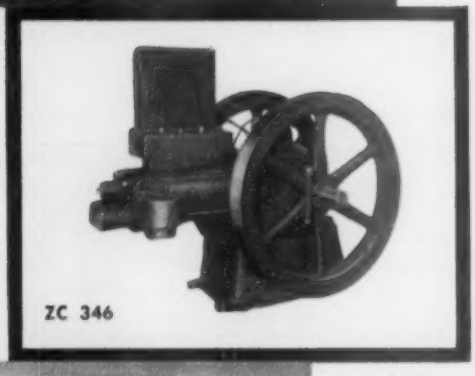
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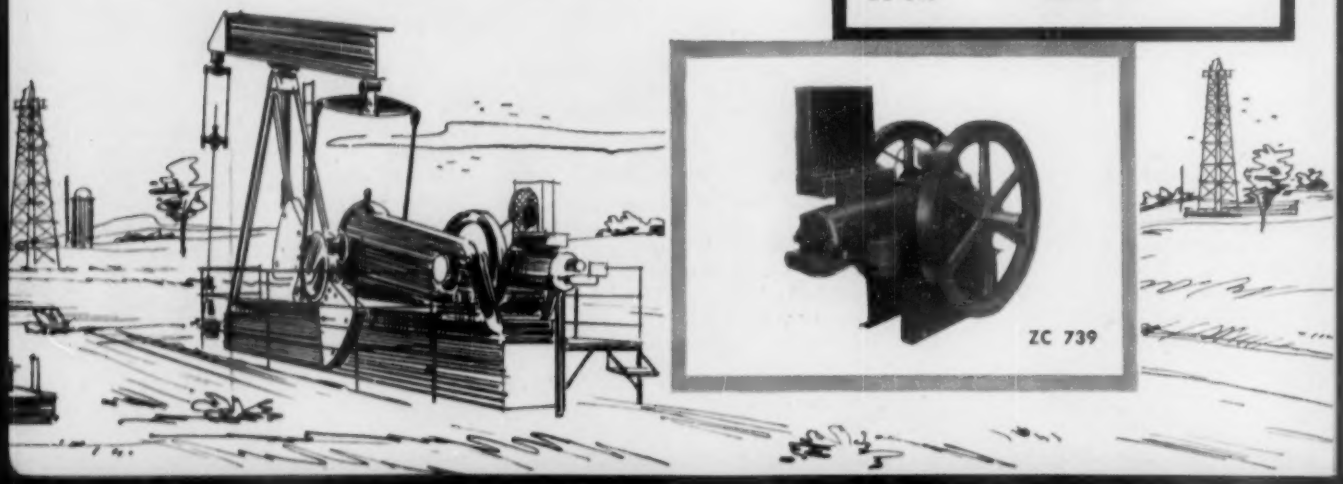

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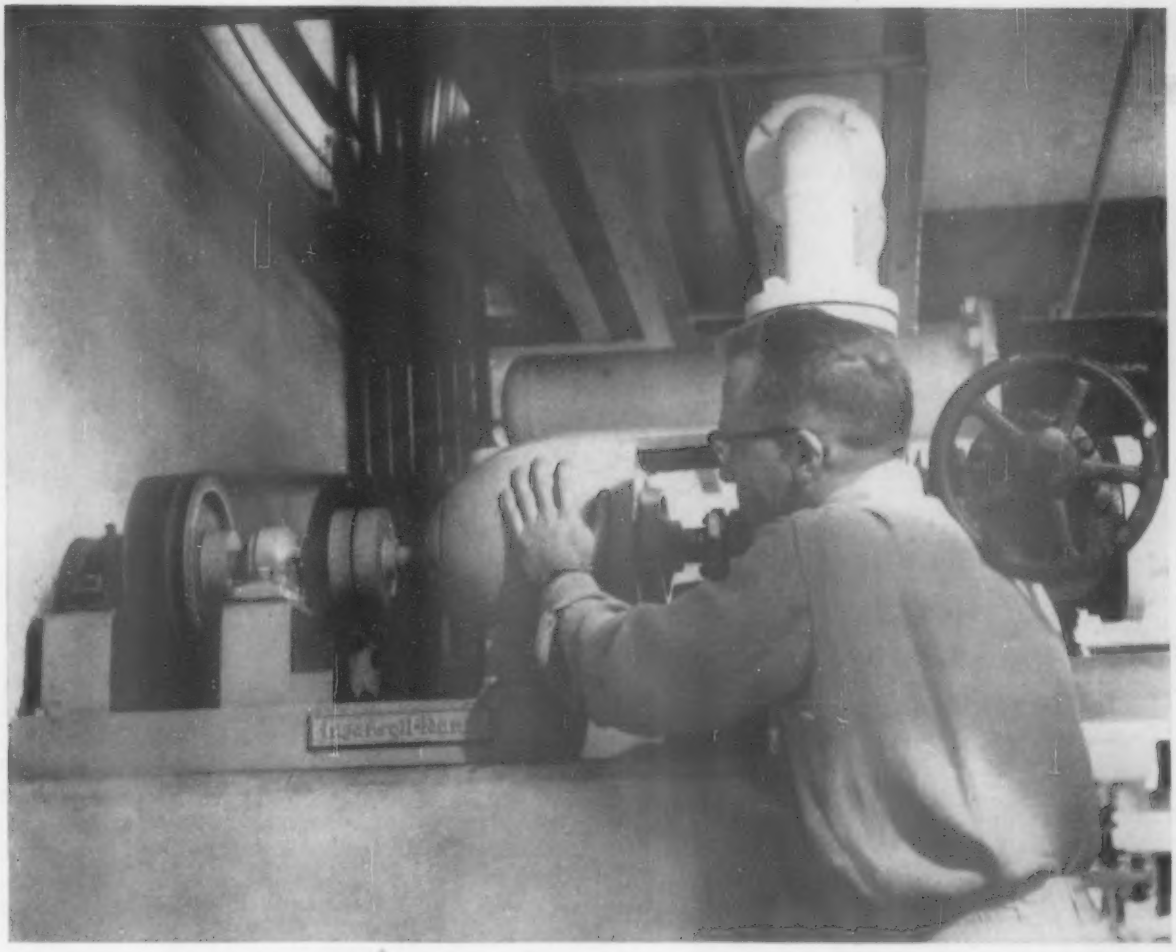

2 years–792 million gallons pumped with B. F. Goodrich V belts

THAT set of B. F. Goodrich high-capacity V belts has been in constant use for 2 years driving a water pump and oil pump in a natural gas pumping station. During this time more than 792 million gallons of cooling water and oil have been pumped without a single shutdown because of belt trouble.

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Grommet construction is the reason B. F. Goodrich high-capacity V belts outlast and outperform other types of premium belts. Only with grommet construction is it possible to *increase* the number of cords reinforcing a V belt and still retain flexibility and resilience. Grommets are two extra strong cord loops inside the belt, like twisted cords except that they're endless. The B. F. Goodrich high-capacity V belt carries a 40% higher horsepower rating because it's built with larger grommets, having 40% more tensile strength.

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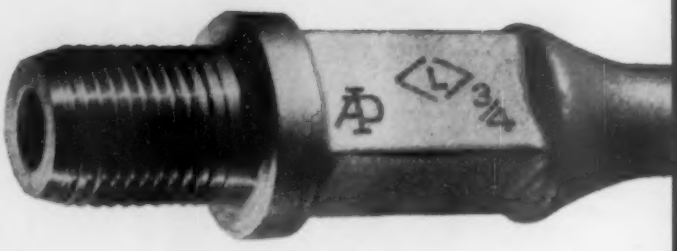
Grommet—T. M. The B. F. Goodrich Co.

B.F.Goodrich

INDUSTRIAL PRODUCTS

IN CO_2 CORROSION...

Grade "L" Sucker Rods provide their own inhibitor



METALLURGISTS and oilfield operators know by their records that "Oilwell's" Grade "L" Sucker Rods far outlast other rods in carbon dioxide areas.

When these rods, which are high in nickel and chromium and are fully normalized and tempered, are subjected to carbon dioxide (sweet type) corrosion, a thin deposit of calcareous substances quickly forms on the rod's surface. The rod's unique grain structure promotes the retention of this deposit as a thin surface coating which insulates the metal rod from further contact with corrosive elements; thus inhibiting further attacks on the metal and extending—sometimes indefinitely—its useful service life. The assistance of a chemical inhibitor is warranted, however, in severe corrosive conditions.

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As a matter of fact, service life 2 to 3 times longer is common when "Oilwell" Grade "L" Sucker Rods are used to resist CO_2 corrosive conditions.

SEND for a free copy of our Sucker Rod Comparison Chart . . . and let an "Oilwell" Production Specialist show you why Grade "L" Sucker Rods are superior to other rods in combatting "ringworm" corrosion. Then try alternating Grade "L" with the rods you previously favored . . . in your own well.

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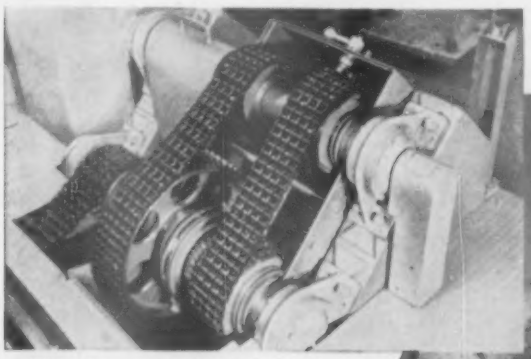
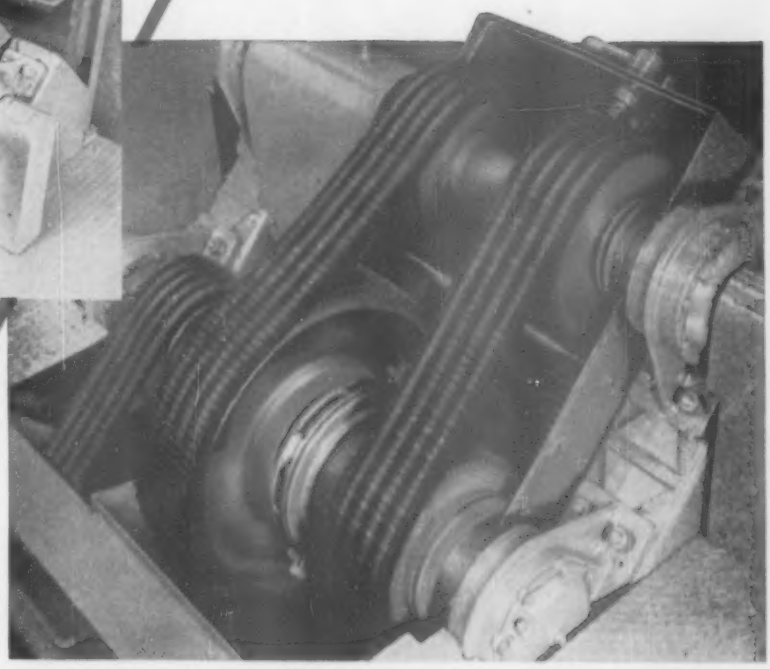


RESISTANCE TO TENSILE STRESS is achieved by use of properly heat-treated, accurately-machined sidebars made of premium steel and fitted with properly-hardened pins, bushings and rollers. But to resist *operational* stresses, additional controls over dimensional accuracy, uniformity and roller resiliency are essential.



STRENGTH OF CHAIN IN MOTION is accomplished through tensile strength *plus* special Link-Belt refinements. These include pitch-hole preparation, micro-finish of parts, special processing of sidebars, prelubrication and rigid quality control from initial selection of materials to final protective boxing. It means longer chain life on this two-speed pump drive of 5-section drive group on National Supply Company's No. 160 rig.

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LINK-BELT gives you dynamic strength that comes from these important EXTRAS

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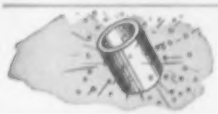

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SHEPHERD'S CROOK COTTERS will remain in place under severe operating conditions.

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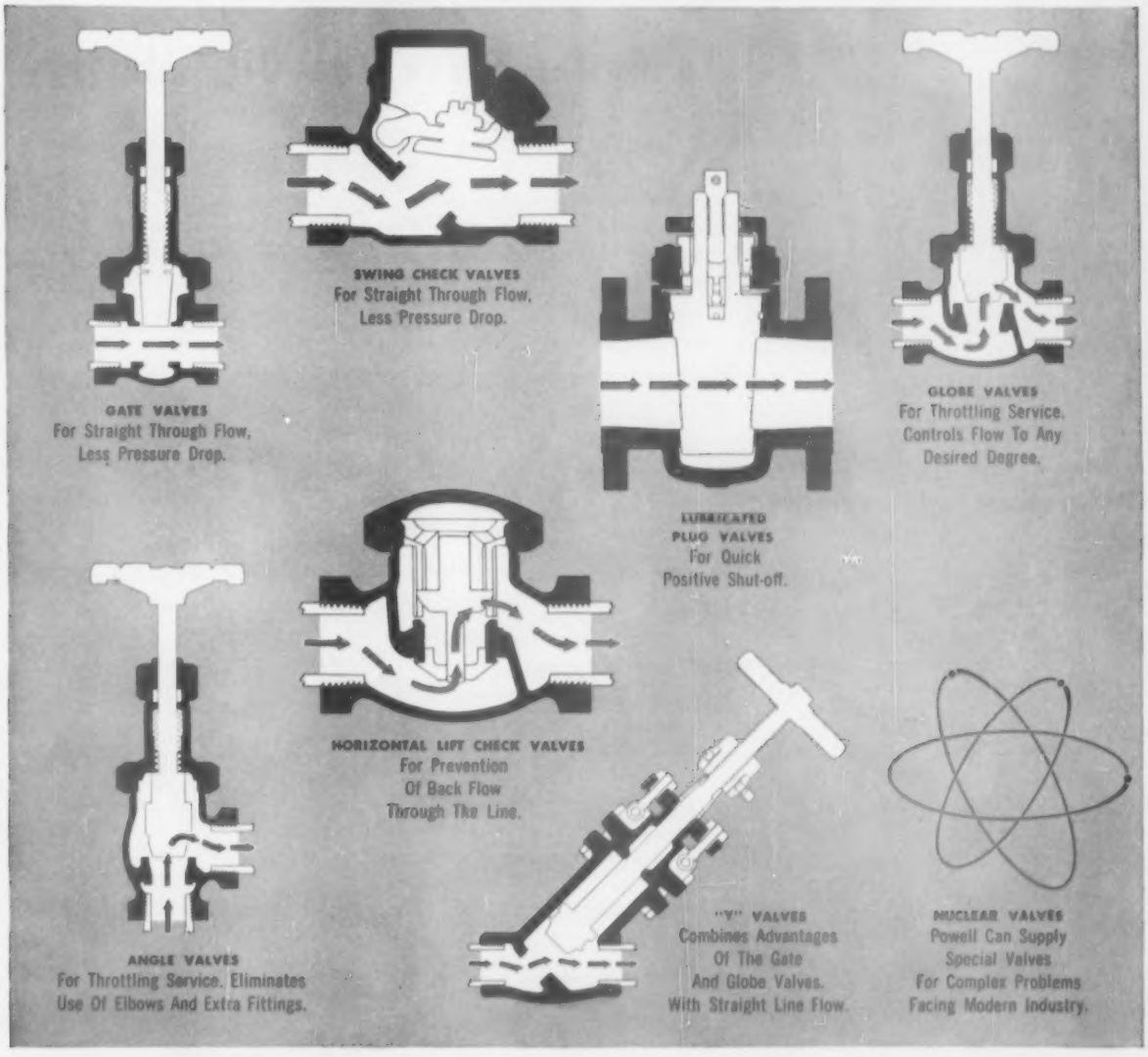

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Buildings "tailor-made" to your needs at a "ready-made" savings

Attractive, durable warehouses, offices, pumping stations or other buildings can be yours at low cost. Armco Steel Buildings give you the economy of standardized construction plus a wide range of sizes to meet your building needs.

Armco Buildings go up in hours and require little or no maintenance. They are sturdy and weathertight. For future expansion they can easily be extended with standard parts. Interiors can be unfinished. Or, if desired, you can insulate and finish the interior according to your needs.

Write to us for complete information on sizes and other details. Armco Drainage & Metal Products, Inc., 5366 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

WAREHOUSE

Clear-span widths allow full use of interior space.

PUMPING STATION

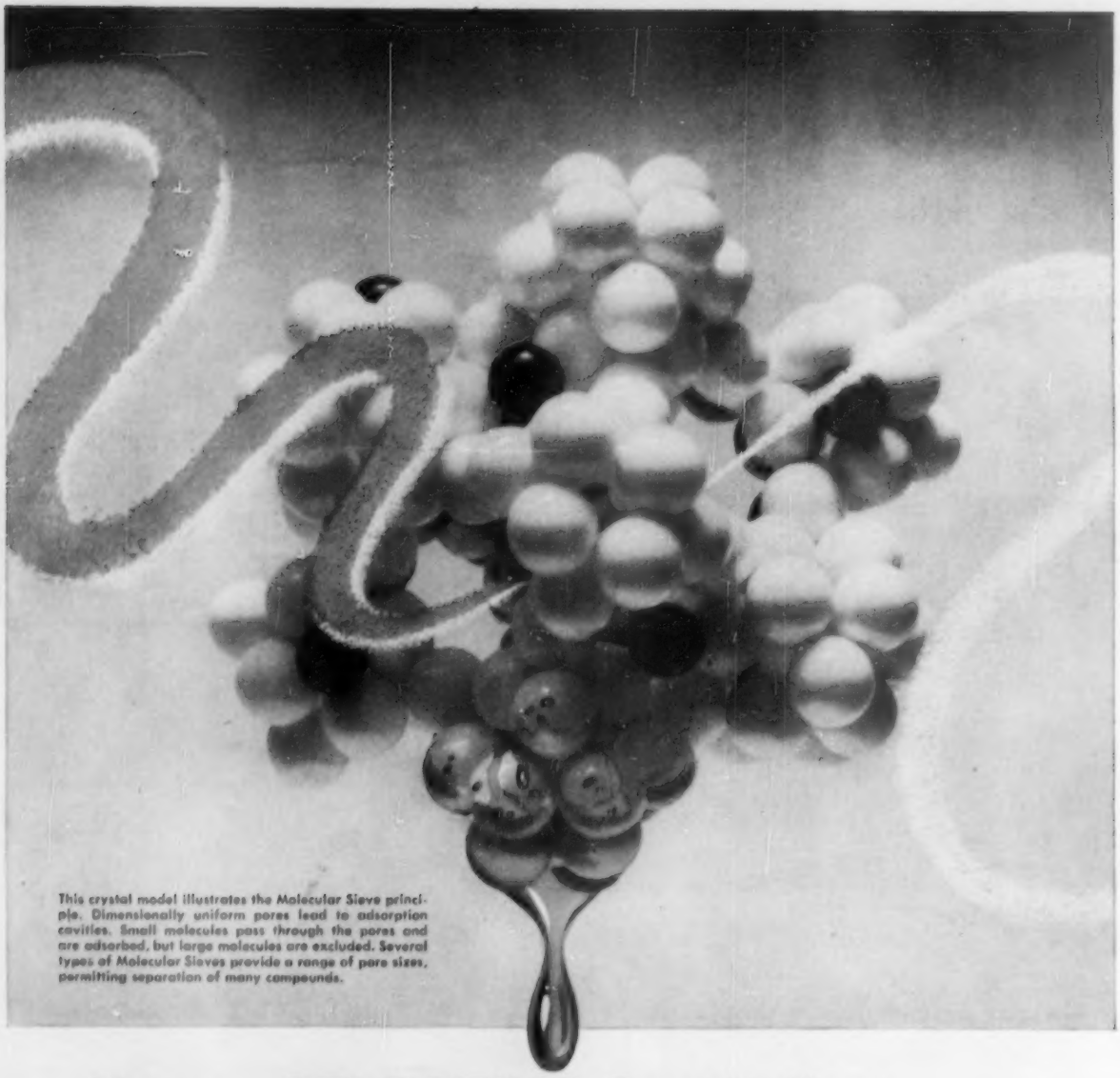
Variety of sizes and layouts fit the building to your needs.

OFFICE

Interiors can be plain or as elaborate as desired.

ARMCO Steel Buildings

ARMCO®



This crystal model illustrates the Molecular Sieve principle. Dimensionally uniform pores lead to adsorption cavities. Small molecules pass through the pores and are adsorbed, but large molecules are excluded. Several types of Molecular Sieves provide a range of pore sizes, permitting separation of many compounds.

Now...SELECTIVE Separation with MOLECULAR SIEVES

LINDE Molecular Sieves, a new *class* of adsorbents, offer unique performance in product purification and recovery. These crystalline zeolites provide selective separation of gas and liquid mixtures in *three* ways...difference in molecule size...or polarity...or carbon bond saturation.

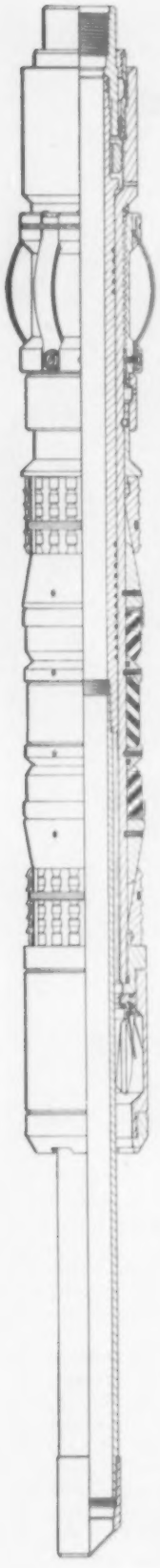
Selective removal of contaminants, even in trace amounts, is possible at temperatures up to 300° F. Selective recovery of valuable stock is often accomplished without regard to relative boiling points. Co-adsorption eliminates extra processing steps by removing several impurities simultaneously. High capacity is realized through a wide range of operating conditions.

Typical uses for Molecular Sieves are the separation of n-paraffins from iso-paraffins and cyclics . . . extraction of olefins from refinery streams and top gases . . . removal of catalyst poisons from olefins . . . sweetening of natural gas and reformer hydrogen . . . purification of annealing gases.

For a descriptive booklet, "Molecular Sieves for Selective Adsorption," write Dept. O-1, Linde Air Products Company, A Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

Linde TRADE MARK MOLECULAR SIEVES

The term "Linde" is a registered trade-mark of Union Carbide and Carbon Corporation



NEW DESIGN GIVES ADDED ADVANTAGES TO 1-TRIP PACKER

HALLIBURTON'S IMPROVED

TYPE "C" PRODUCTION PACKER

WITH LATCH-ON SEALING UNIT

More proof that Halliburton's continuous research and development program pays off in savings to thrift-minded oil men! Striving to perfect the dependable, economical performance of the 1-trip Type "C" Production Packer, Halliburton has improved it still further... in design, performance and economy.

EXPENSIVE ACCESSORY SAVED

Increased bore diameter facilitates the use of standard tubing as tail pipe. This eliminates the necessity for using a flush joint anchor... and the cost of this expensive item.

NEEDS LESS WEIGHT

A unique latching device reduces the weight required on the packer and in many cases permits the tubing to be placed in tension. It can be operated repeatedly, simply by setting down and picking up the tubing.

EASIER TO SET

The drag spring body and setting sleeve have been combined and moved to the upper part of the tool. Rotation to the right causes the top slips to set, then an upward pull on the tubing expands the packer rubbers and sets the bottom slips before the tension sleeve parts. Four balls, seated in recesses in the mandrel, secure the top slip support more rigidly than shear pins while running in, and offer little or no resistance to releasing when packer is rotated through the drag spring body, thus reducing torque necessary to set packer by at least one half.

When you can get advanced design, better performance and greater economy all in this one 1-trip Packer, it's good business judgment to specify Halliburton's improved Type "C" Production Packer.* Your Halliburton field representative has latest data. Call your local or district office of the Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

**The new improved type "CL" production packer, with these same features, is also available for setting on electrical wire lines.*

COMPLETE DATA SENT ON REQUEST

Get this valuable information for your Halliburton Service File

HALLIBURTON

CEMENTING SERVICES

251 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

IT'S BRAND NEW!

The O-C-T UNIVERSAL TUBING

. . . with 6 interchangeable dual string and single string tubing hangers!

The new OCT universal tubing head is a versatile tool whereby an operator may singly or dually complete a well at will with complete control throughout the entire operation.

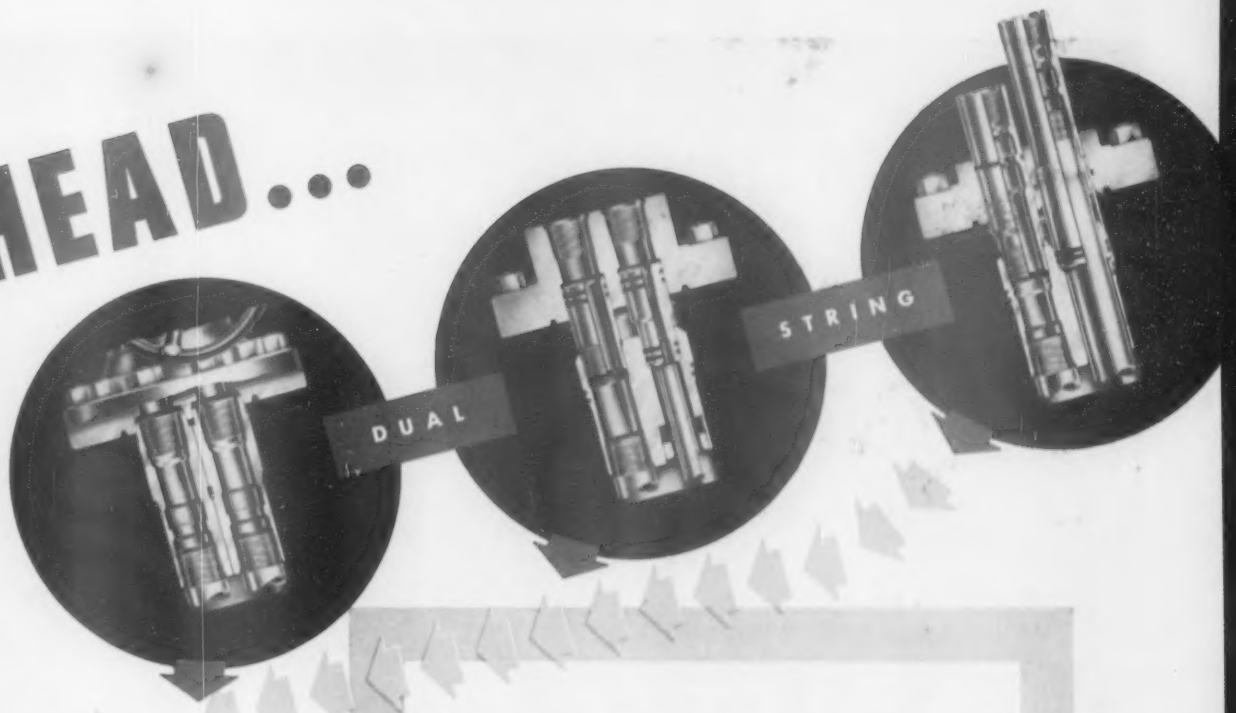
A complete range of interchangeable tubing hangers for both dual and single strings is available for use in the universal tubing head. As a result, any last minute change in completion procedures can be made without the necessity of changing tubing heads or using special attachments. In the event only one producing sand is found in a proposed dual well, the well may be completed by using a single completion hanger in the body of the OCT universal tubing head. If a second sand is found in a well originally scheduled for single completion, the well may be dually completed by means of using a dual hanger instead of the single hanger originally contemplated.

In order to handle both single and dual completion hangers, the OCT universal tubing head is equipped with two retractable aligning screws which are used to align the dual hanger with respect to the head itself. These aligning screws are placed in a retracted position when single string hangers are used in the same head.

Control of the entire completion procedure is assured as all hangers are run through, landed and locked in place prior to the removal of the blowout preventers. Once the head has been installed, all seals can be field tested through test ports located in the flanges.

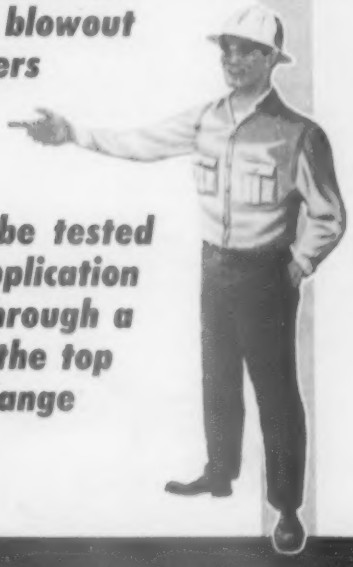
This universal head is available in 600 through 2900 series and flange sizes varying from 6" to 10". In those instances where the operator does not desire to remove the existing tubing head in order to dually complete a well, an adapter spool is available.

HEAD...



Any of six interchangeable hangers may be landed and locked in place through blowout preventers

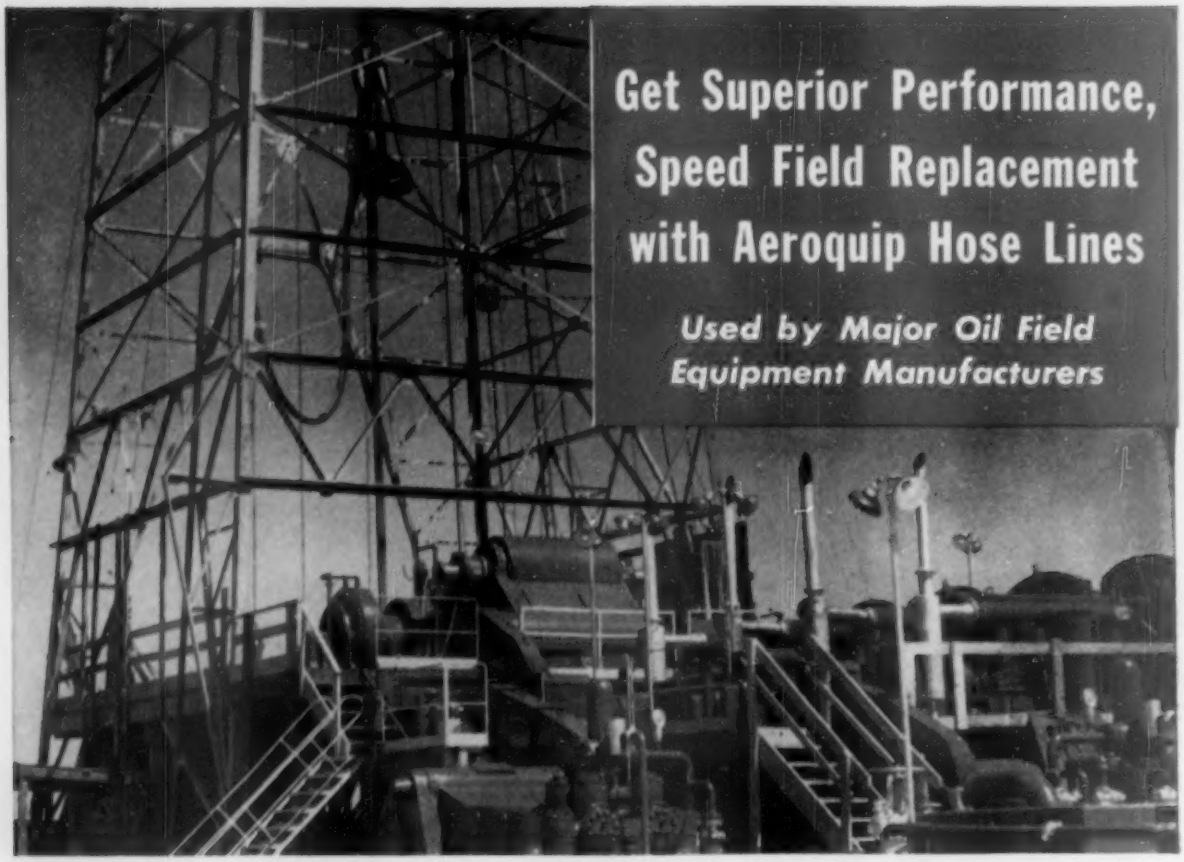
All seals may be tested by a single application of pressure through a test port in the top adapter flange



O·C·T

OIL CENTER TOOL CO.

Export Representatives: South America — East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

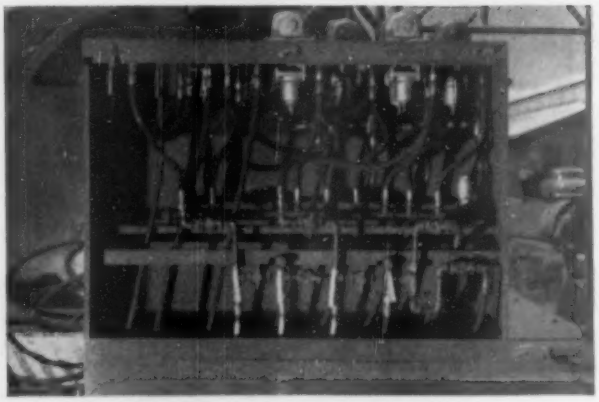


Get Superior Performance, Speed Field Replacement with Aeroquip Hose Lines

Used by Major Oil Field Equipment Manufacturers

Aeroquip Hose Lines are used on hydraulic controls and diesel engines on drilling rigs.

Round-the-clock drilling in remote locations calls for dependable performance of equipment. To minimize downtime, companies like National Supply Company use Aeroquip Flexible Hose Lines for hydraulic, diesel fuel and lube oil lines. Users can replace damaged lines fast by making new hose assemblies right in the field. Bulk hose can be cut to length and fittings attached with hand tools. See your nearest supply store or write us for full information on Aeroquip Hose Lines.



Hydraulic controls make drilling safer, more efficient. Aeroquip is used as original equipment on this Consolidated control panel.

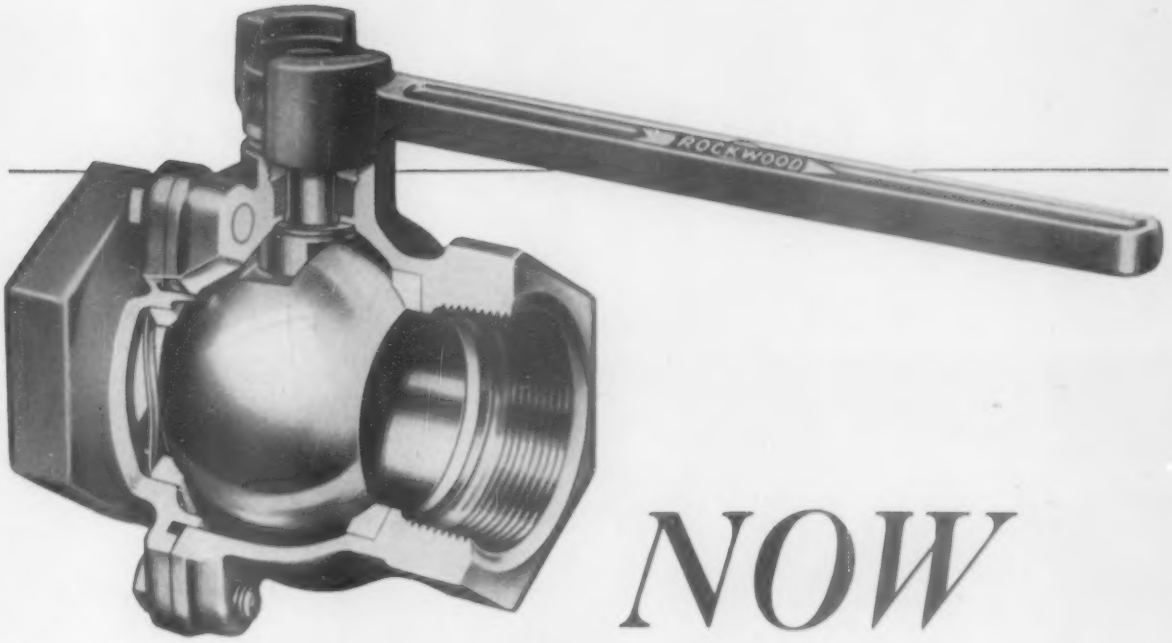
Aeroquip

REG. TRADEMARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

IN CANADA: AEROQUIP (CANADA) LTD., TORONTO 15, ONTARIO

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD



NOW

a new STEAM valve with all the Rockwood Ball Valve advantages!

The new Rockwood Bronze Ball Valve for use with steam offers you many unusual benefits.

It Handles up to 125 Pounds of Steam per square inch and 350°F, with ease.

It's Leakproof — even after continued use Rockwood Steam Ball Valves stay dry.

It Opens and Closes Quickly — only a quarter turn is needed to open or close Rockwood Ball Valves.

It Has Longer Wear-Resistance — chrome-plated bronze ball withstands abrasion, scratching and pitting.

Rockwood's new Ball Valve for use with steam comes in pipe sizes from ¾" up to 2". Send coupon for full information and data. Distributors in all principal industrial areas.

ROCKWOOD BALL VALVES

FULL, ROUND FLOW

ROCKWOOD

ROCKWOOD SPRINKLER COMPANY
1267 Harlow Street
Worcester 5, Mass.

Send me illustrated folder on Rockwood's new Ball Valve for use with steam.

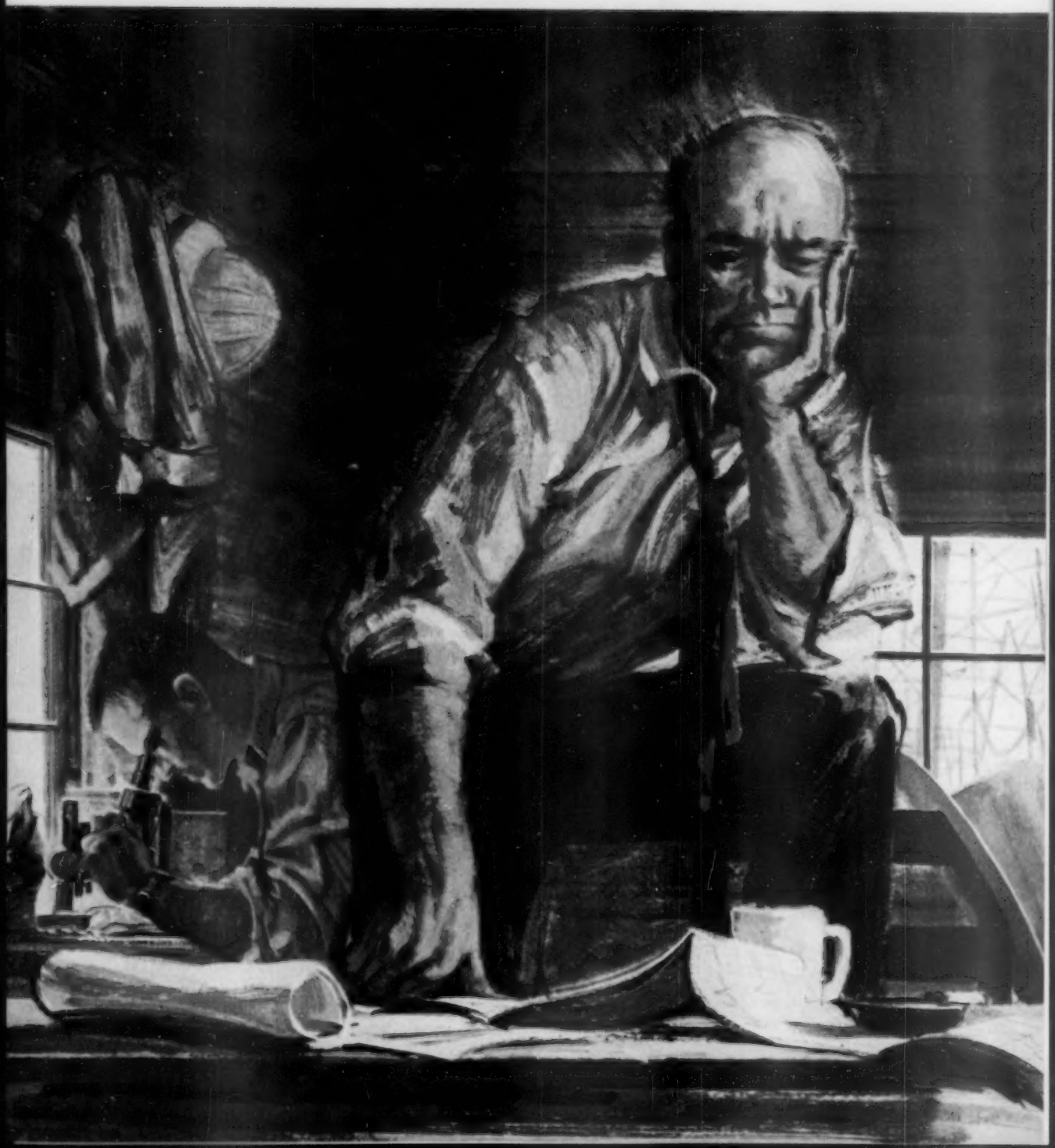
Name.....

Title.....

Company.....

City.....Zone..State.....

To set pipe or not to set pipe.....



. . . . has this ever been your $64,000 question ?

Few indeed are the oil men who have been spared the necessity of making this decision. The well in question may be a wildcat. Perhaps it is a stepout from a proven field. There are some indications of *possible* oil or gas production. A lot of money is riding on your decision.

In such cases you need every ounce of *accurate* formation data possible to obtain. True formation pressures are a must. Inaccurate pressure indications could influence you to abandon a commercially productive well. Or they might cause you to set a string of costly pipe and send more good money after bad.

Helping operators answer this tough question is old hat with Johnston (29 years to be exact). The Tension Type Pressure Recorder used *exclusively* with Johnston Formation Testers is so sensitive that it faithfully records pressure changes of as little as *five one-hundredths of one per cent!* A rugged built-in thermometer and clock leave absolutely no need for guess work or approximation.

Whether it is a well of questionable productivity or a well in a proven reservoir, you want the truth and nothing but the truth insofar as formation pressures are concerned. That's what you get with a Johnston Test . . . not approximate pressure values.

JOHNSTON TESTERS

first in drill **stem testing**

P. O. BOX 98,
HOUSTON, TEXAS
LOS ANGELES, CALIF. • CALGARY, CAN.

A Subsidiary of Schlumberger Well Surveying Corporation

THERE'S A DIFFERENCE IN DRILL STEM TESTING . . . AND JOHNSTON MAKES THE DIFFERENCE!

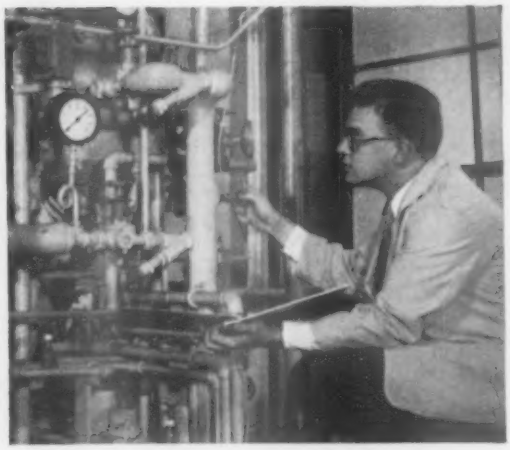
toughest

Royal Blue rope
is made of the *toughest*
rope wire ever developed...
Roebling Type 1105

John A. Roebling's Sons Corporation, Trenton 2, N. J., Subsidiary of The Colorado Fuel and Iron Corporation BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 81 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2340 GLENDALE-MILFORD RD., EVENDALE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH, 1723 HENRY W. OLIVER BLDG. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6.

Use the Skill and Know-How of Pittsburgh's

415 Finishes Technologists



● Processes for producing new chemical compositions used in making better surface coatings for petroleum needs are developed in a special pilot plant.

● Newly formulated finishes are ground on a laboratory three-roll mill to test minute particles and dispersion.

Paint industry's most modern research facilities are at your service to provide tough, long-lasting finishes that resist corrosion and weather-wear . . . without increasing your payroll.

THERE IS A GROWING NEED for tougher and longer-lasting coatings to meet unusual conditions. This brings with it demands for tailor-made finishes that give greater protection against corrosion and weather.

● **To help you get** finishes that meet your most critical specifications, Pittsburgh now offers you the most modern facilities for fundamental and applied research in the paint industry. In its new Paint Research Center at Springdale, Pa., and in the development laboratories of its 11 paint plants, Pittsburgh maintains a staff of 415 chemists, engineers and technicians.

● **From this group have come** many important developments in finishes for the petroleum industry. Among these is Pittsburgh's brilliant synthetic White TANKHIDE Double Cover. This is a combination of intensely white controlled-chalking titanium pigments and weather-resistant vehicles. One spray coat of TANKHIDE Double Cover produces the same film thickness as two coats of conventional synthetic finish. This saves up to 25 percent in labor and time as reported by painting contractors. Besides brilliant white, TANKHIDE Double cover is available in colors.

● **If you have** new or unusual finishing problems on structures or equipment bring them to us. We'll gladly place our manpower and facilities at your disposal to develop superior coatings without adding to your payroll. Write, wire or call Pittsburgh Plate Glass Company, Industrial Finishes Division, 1 Gateway Center, Pittsburgh, Pa.

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

● Films made with new compound and synthetic resins are tested in special equipment for tensile strength.

● Leading oil and gas companies in all parts of the world have used many types of special Pittsburgh finishes for years with uniform success.

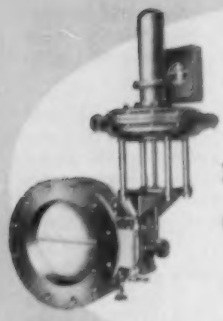
GET THE BEST

Needle Valves

Rugged, outstanding performers for proportional control of small flows. Interchangeable seat rings and plugs. For water, gas, steam, chemicals. Trim and body materials available for "difficult" fluids. Shown here with unique *reversible* Stabilflo Motor.

Saunders Type Valves

A complete line, particularly suited to handling of highly corrosive fluids, or fluids containing solids in suspension. Available with Stabilflo Motor as shown, or with Stabiload Cylinder and Power Positioner.

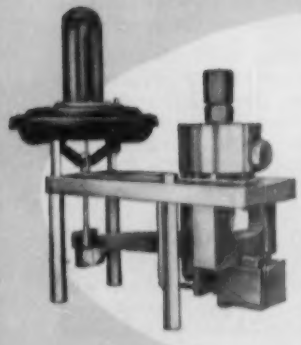


Butterfly Valves

Light and heavy duty types, with angle or swing-through seating, in spool or wafer body style, for low pressure air, gases in combustion control, steam, high pressure gases and liquids, etc. Available with Stabilflo Motor (shown) or cylinder operator.

Gate Valves

Guillotine-type slide valves, specially designed to handle pulp fibre, slurries, and similar fluids. Available with Stabiload Cylinder and Power Positioner as illustrated, for throttling service, or with 4-way pilot valve for on-off service.



Super-Pressure Valves

For throttling or let-down service up to 30,000 psi. Features an exclusive high-pressure bellows seal. Port sizes and connections to meet high pressure process specifications.

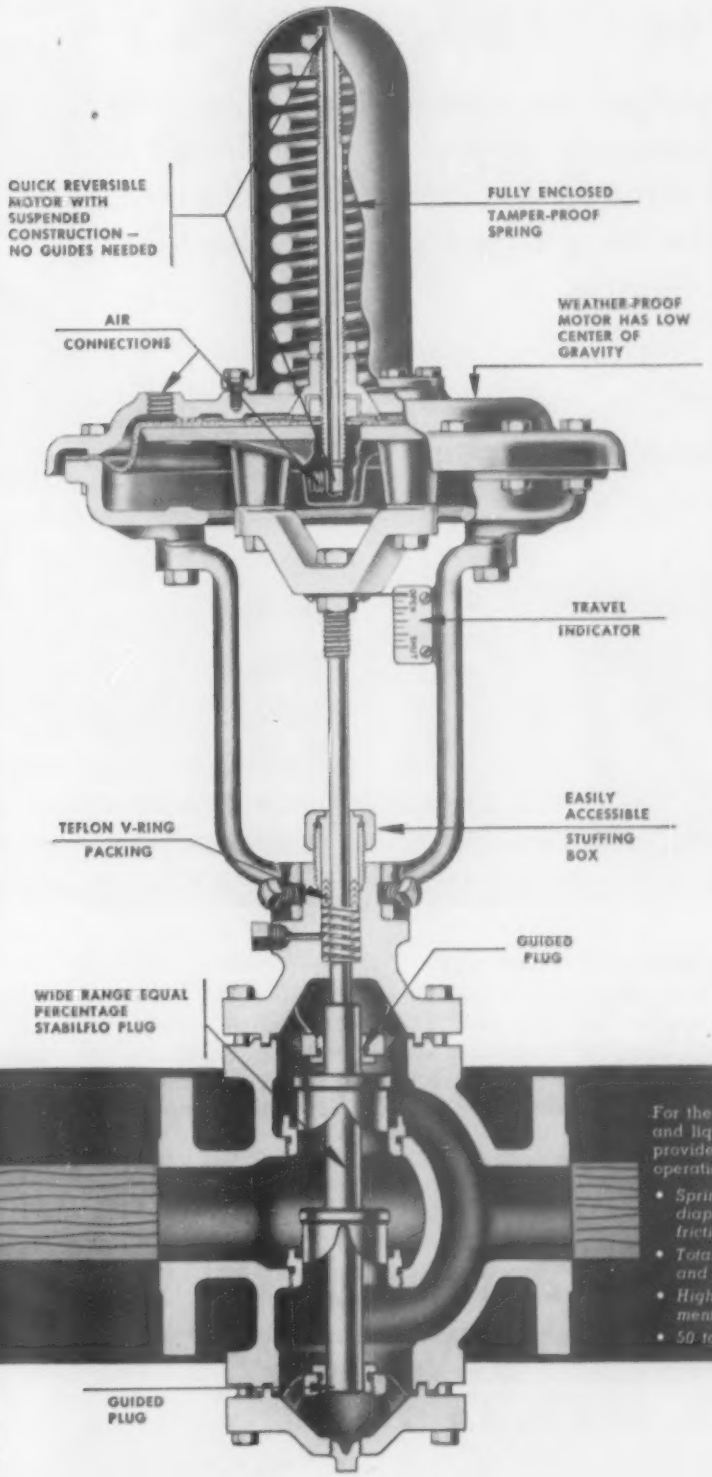
FOXBORO CONTROL VALVES

Reg. U.S. Pat. Off.

8 Strategic Branch Shops for Coast-to-Coast Service: **Pittsburgh, Pa. • Chicago (Skokie), Ill. • Dallas, Tex. • Houston, Tex. • San Francisco (San Leandro), Cal. • Los Angeles, Cal. • Montreal, Que. • Vancouver, B. C.**

SOLUTION TO YOUR CONTROL VALVE PROBLEMS

...with Foxboro Pneumatic Control Valves


QUICK REVERSIBLE MOTOR WITH SUSPENDED CONSTRUCTION — NO GUIDES NEEDED
FULLY ENCLOSED TAMPER-PROOF SPRING
AIR CONNECTIONS
WEATHER-PROOF MOTOR HAS LOW CENTER OF GRAVITY
TRAVEL INDICATOR
EASILY ACCESSIBLE STUFFING BOX
TEFLON V-RING PACKING
GUIDED PLUG
WIDE RANGE EQUAL PERCENTAGE STABILFLO PLUG
GUIDED PLUG

You can always be sure of getting the control valve best suited to flow conditions and control actions when you specify Foxboro. No other single source offers such a wide variety of control valves for specific applications. None other has Foxboro's experience in applying them — in every phase of industrial processing.

Your choice extends from valves for simple on-off control at one extreme, to specialized proportioning control at the other; for high vacuum work to operation at 30,000 psi; for temperatures from −350° to +1000°F. And there's a wide choice of plug designs — and of alloys and trim to handle even severely corrosive and erosive fluids.

You can save shipping cost and time, too, buying direct from Foxboro's strategically located branch shops. They're staffed by experts.

A few typical control valves from Foxboro's complete line are illustrated here. For full details, or specific information on your problem, call your nearby Foxboro Field Engineer or write The Foxboro Company, 6012 Neponset Ave., Foxboro, Mass.

STABILFLO CONTROL VALVES

For the great majority of temperature, pressure, flow, and liquid level control applications, this basic valve provides unsurpassed sensitivity and troublefree operation. Unique design features:

- *Spring-above-diaphragm construction makes diaphragm motor self-aligning, virtually free from friction and hysteresis.*
- *Totally enclosed spring protects against tampering and corrosion.*
- *High-lift wide range V-port provides greater increment of lift for given change in air pressure.*
- *50 to 1 rangeability... equal percentage characteristics.*

Prompt Service . . .
and a bonus!

WELDED PIPE from J&L SUPPLY

Would you like a little bonus – in sincere appreciation of your pipe business? It will come to you from J&L in the form of the very finest service – the kind you deserve.

All right, get your J&L Store on the telephone and the bonus is yours! Moreover, we'll oblige promptly.

To refresh your memory . . .

J&L Buttweld and Lapweld are made to API 5-L specifications. Single lengths 1¼" and smaller; single or double random lengths sizes 1½" to 4" inclusive. Commonly supplied threaded or with plain ends; plain ends beveled or square cut. Regular mill coating, or uncoated for field wrapping.

J&L

Jones & Laughlin

SUPPLY DIVISION – Tulsa

5-5A SERVING THE UNITED STATES AND CANADA

Second Year for X2 Rods in the Crookham No. 1

A tapered string, made up of 4600 ft of ¾-in. and 1950 ft of ⅞-in. Bethlehem X2 carbon-manganese sucker rods, is now in its second year of service in the Crookham No. 1 Well, in the Whitesboro Field near Sherman, Texas.

The Crookham No. 1 is operated by Midwest Oil Corporation. It is equipped with a Bethlehem 160D-20S pumping unit, and is producing 26 bpd of 26-gravity oil, with some water. Production is currently from 6550 ft, from the lower Dornick Hills Sands.

The Bethlehem X2 rod is ideal for medium pumping duty in non-corrosive wells, as well as in wells which are properly inhibited, because it is made from top-quality carbon-manganese steel. Besides, it is carefully normalized to provide uniform mechanical properties.

In addition to the X2 rod, Bethlehem produces three other grades of carbon and alloy rods, plus a full line of accessories. With so wide a range from which to choose, you'll have little difficulty in selecting a rod to meet virtually any pumping condition or corrosion problem. If you would like to learn more about Bethlehem sucker rods, just get in touch with your Bethlehem distributor.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Buried any treasure lately? If so, did you protect it with BLUE FLAG?

Don't let underground corrosion rob your company of huge pipeline investments. For less than one-half of one per cent of the original cost, you can protect pipelines with Blue Flag Pipe Wrap.

L·O·F Glass Fibers' Blue Flag is made of special inert glass which resists the destructive action of soil chemicals. A Blue-Flag reinforced coating will extend pipeline-life years longer than unreinforced coatings.

What's more, Blue Flag greatly increases wrapping efficiency. High tensile strength virtually eliminates breakage . . . uniform porosity keeps "holidays" to a minimum . . . enamel cold flow is retarded, while strength is increased . . . pipeline coating is protected from backfill damage.

Blue Flag Reinforcing Pipe Wrap is available from a nearby distributor-warehouse. For full details, write: L·O·F Glass Fibers Company, Dept. 78-126, 1810 Madison Avenue, Toledo 1, Ohio.

LOF GLASS FIBERS
BLUE FLAG PIPE WRAP

L·O·F GLASS FIBERS COMPANY

TOLEDO 1, OHIO

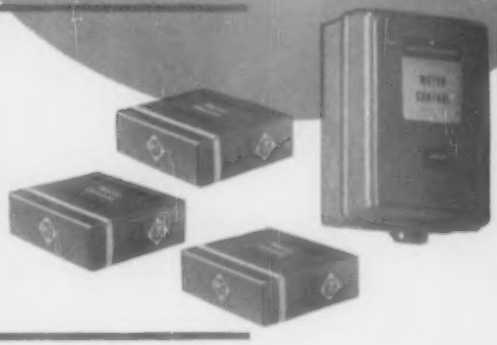
Makers of glass fibers by the "Electronic-Extrusion" process

For Complete Pipeline Protection, use: BLUE FLAG Reinforcing Pipe Wrap • **DURAMAT** Protective Outer Wrap • **DURAMESH** Pipeline Fabric • **DURATAPE** Pipeline Joint Wrap

ALLIS-CHALMERS

MOTOR CONTROL

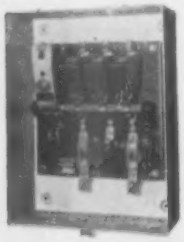
a Complete Line



SIZE 0-3 STARTERS

Converta-Kits Permit Easy Modification of Basic Starter

You get MORE . . . more flexibility with Allis-Chalmers control. A screwdriver and the proper *Converta-Kit* are all you need to change a basic Allis-Chalmers size 0-3 starter into the exact unit demanded by your production. *Converta-Kits* are available for push-button, selector switch and electrical interlock modifications. Starter replacement parts—contacts, magnetic coils and overload relays —are also available in packaged kits.



1. Arc across contacts as they start to open.
2. Strong blowout action forces arc to center.
3. Contacts fully open — arc extinguished.

NEW LINE OF SIZE 4-5-6 STARTERS

Quick Quenching Extends Contact and Chute Life

Heart of these starters is a new contactor which uses a revolutionary principle of arc interruption. In centering the arc, increased blowout action and fast quenching result from a combination of thermal convection and magnetic action. Since the arcing time is sharply curtailed, contact and chute life are greatly extended.

A-4988

HIGH VOLTAGE STARTERS

Complete "Line-to-Load" Control and Protection

Allis-Chalmers Type H starters are built in a wide range of ratings for squirrel-cage, wound-rotor and synchronous motors . . . for full or reduced voltage — reversing or non-reversing — with plugging, dynamic braking and multi-speed features. Built into the starter is the type and degree of protection dictated by the application.

What is your control problem?

As manufacturers of a diversified line of industrial equipment, Allis-Chalmers has solved thousands of control application problems. This specialized experience is yours when you specify Allis-Chalmers control. See your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

Converta-Kit is an Allis-Chalmers trademark.

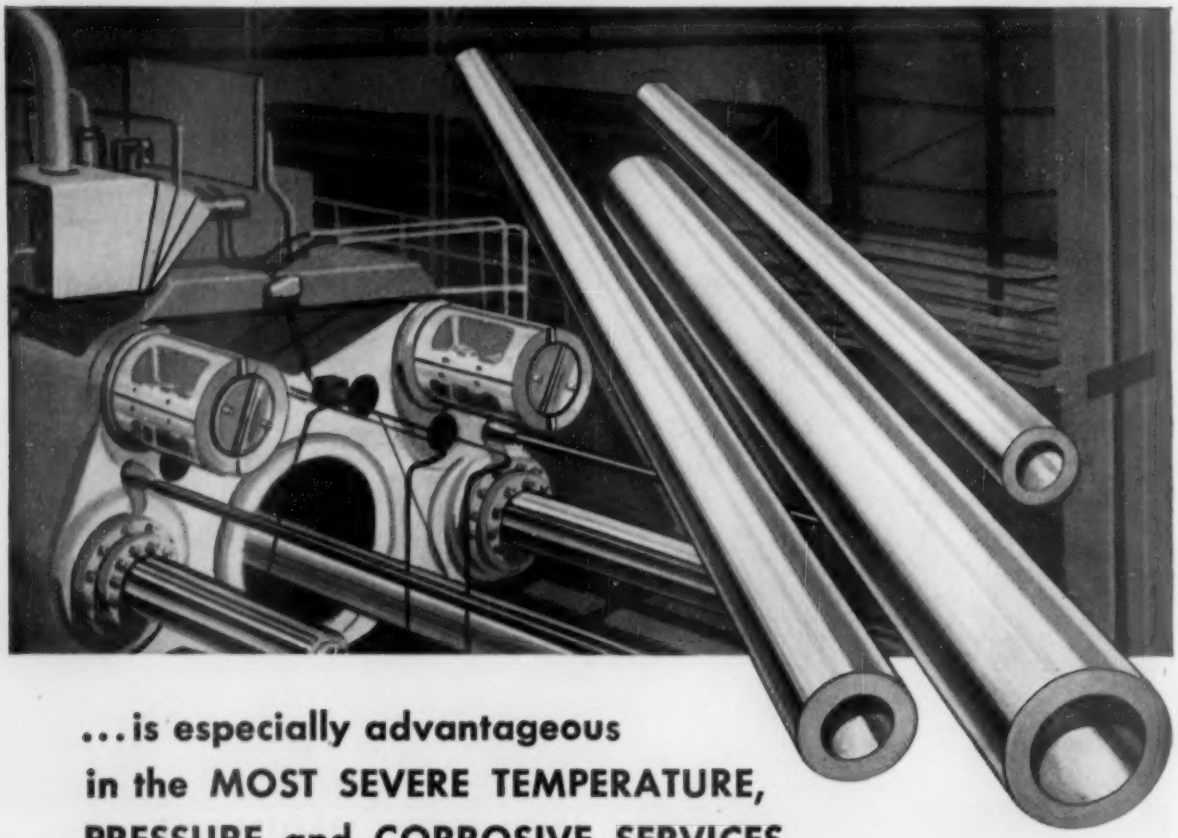
A-C ALLIS-CHALMERS

ALLIS-CHALMERS

HIGH INTEGRITY

EXTRUDED ALLOY STEEL PIPE

available from 4″ to 22″O.D. in practically any wall thickness



...is especially advantageous in the MOST SEVERE TEMPERATURE, PRESSURE and CORROSIVE SERVICES

A specially-built 12,000 ton extrusion press – capable of processing any of the stainless or other ferrous alloys – imparts vastly improved mechanical properties to new Curtiss-Wright ***HIGH INTEGRITY*** pipe. *High ductility with high strength* and *higher resistance to stress at high temperature* are automatically built into even the largest diameters and thickest-wall products. In the larger diameters, 10″ and above, the economics of ***HIGH INTEGRITY*** pipe are particularly attractive.

Major economies are regularly effected in fabrication and installation . . . using the longer units – up to 50 feet. Ultrasonic testing of all ***HIGH INTEGRITY*** pipe – combined with the more conventional test methods – assures uniform, dependable, specification quality of delivered product.

Curtiss-Wright's Metals Processing Division maintains qualified engineering personnel at all branch offices, available for design consultation and specification pricing.

METALS PROCESSING DIVISION

CURTISS-WRIGHT CW

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METALS PROCESSING DIVISION BRANCH OFFICES: . . . . . NEW YORK • HOUSTON • LOS ANGELES

LQ600 VALVES

• NO LEAKAGE • NO EROSION
• NO WIRE DRAWING
. . . In 100,000 applications and 5 years of tests

Famous LQ600 Bronze Valves, with revolutionary Brinalloy seats and discs, now solve maintenance problems in a new wider range of services!

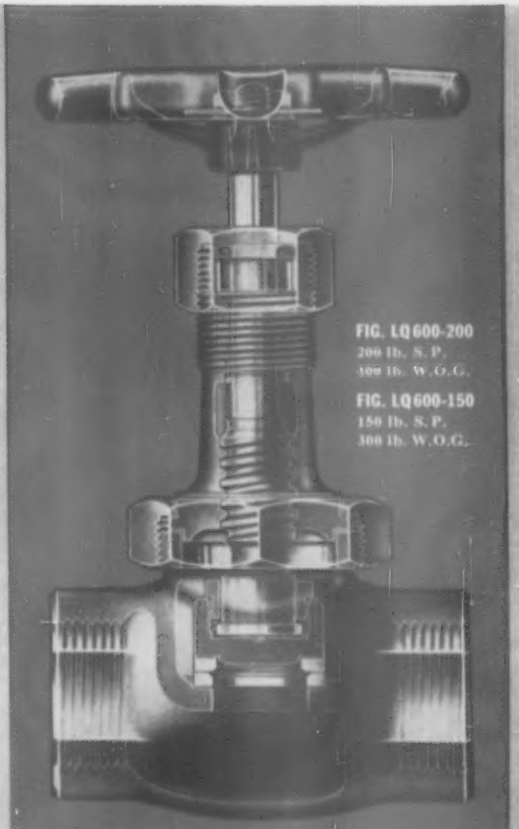
The lower pressure LQ600-150 made valve history during five years of cost-cutting use in a big variety of installations, ranging from "normal" to "exceptionally severe."

Now the higher pressure LQ600-200 offers all the same proved features — plus a stronger body and bonnet of exclusive Lunkenheimer S-1 Bronze. It has a total temperature rating of 550°F.

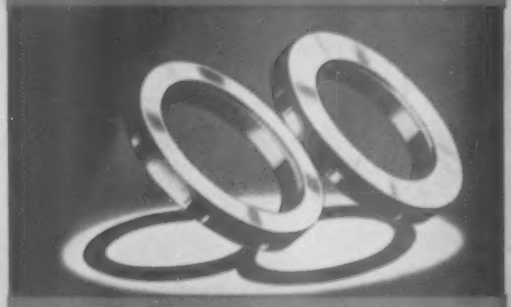
It will pay you to specify and install LQ600 in your toughest 150 and 200 lb. services. New Brinalloy seats and discs resist wear and corrosion to an amazing degree — far greater than 500 Brinell Stainless Steel . . . even outwear case hardened Stainless Steel exceeding 1000 Brinell. The flat seats and discs are micro-optically lapped to a perfect fit — and brazed in to stay.

Call your Lunkenheimer distributor or write The Lunkenheimer Company, Box 360, Cincinnati 14, Ohio.

BRONZE • IRON • STEEL • PVC



NOW AVAILABLE FOR
200 LB. S.P. 550°F. 400 LB. W.O.G. and
150 LB. S.P. 300 LB. W.O.G.
APPLICATIONS



BRINALLOY* SEATS AND DISCS

*Patented Alloy —TM Reg.

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-956-78

Interested in pipe protection?

...HERE'S A SPECIAL MESSAGE FOR YOU!

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TO THOSE CONCERNED WITH
MAXIMUM PIPE PROTECTION

NEW HILL, HUBBELL PLANT AT HAMMOND, INDIANA NOW OPERATING. DOUBLE FORMER PLANT CAPACITY, NEWEST ELECTRONIC CONTROLS. LARGER SKILLED STAFF ASSURE MAXIMUM LIFE EXPECTANCY FOR HILL, HUBBELL WRAPPED PIPE. HUGE NEW STORAGE YARDS FOR PIPE STOCK-PILING. THROUGH RAIL RATE PROTECTION ON MOST ROADS. SPECIFY HILL, HUBBELL, YOUR NEXT JOB.

M. M. BOWEN
VICE PRESIDENT & GENERAL MANAGER
HILL, HUBBELL & CO.

Electronic production control...another "first" by

HILL-HUBBELL & COMPANY

FACTORY APPLICATORS OF COATINGS AND WRAPPINGS

DIVISION OF GENERAL PAINT CORP. • 3091 MAYFIELD ROAD, CLEVELAND 18, OHIO

GUIBERSON TUBING SWAB

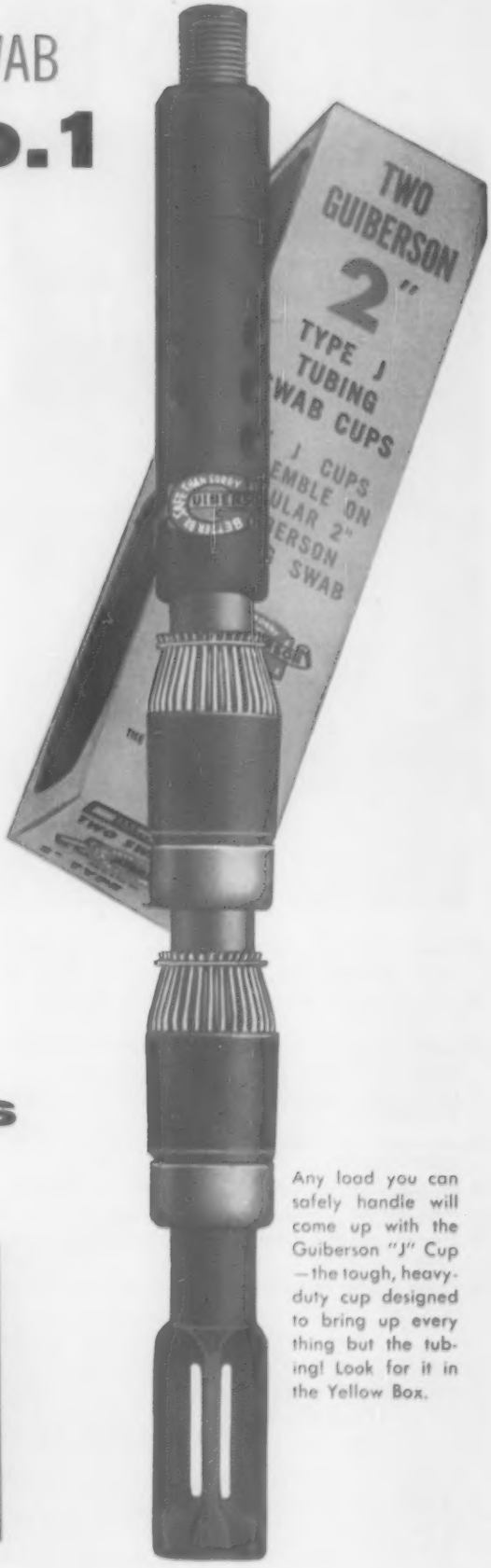
world's no.1 swab

Because it

gives you more efficiency and reliability – more for your money

Because

we manufacture our swab cups in our own rubber plant – from our own carefully compounded synthetic rubber formulas



Any load you can safely handle will come up with the Guiberson "J" Cup — the tough, heavy-duty cup designed to bring up every thing but the tubing! Look for it in the Yellow Box.

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by
Oil Field Supply Stores
Everywhere

at town border and distribution station

GROVE FLEXFLO

Regulators and relief valves give positive accurate control

- Control outlet pressure within narrow limits up to full rated capacity
- Positive bubble-tight seal unaffected by presence of foreign matter
- Quieter operation with no metal moving parts to chatter, slam or bang
- Less maintenance, with no sticking, friction, or corrosion problems
- Accurately controlled by a wide variety of manual or automatic pilots
- Proved in service with gas, air, water, oil and other fluid services
- Effective with temperatures to 150F and working pressures to 1500 psi
- Grove Flexflo Valves and Regulators available in iron or steel, 1" to 12"

The only moving part of the Grove Flexflo is an expansible tube which outlasts ordinary valve mechanisms many times over. Serving both as diaphragm and valve, it is instantly responsive, and closes tightly over scale or foreign matter without leakage or damage. For compactness, high capacity in relation to size, smooth sure control, and low maintenance, specify Grove Flexflo Valves and Regulators for pressure reduction, back pressure or relief services.

605

GROVE FLEXFLO VALVES

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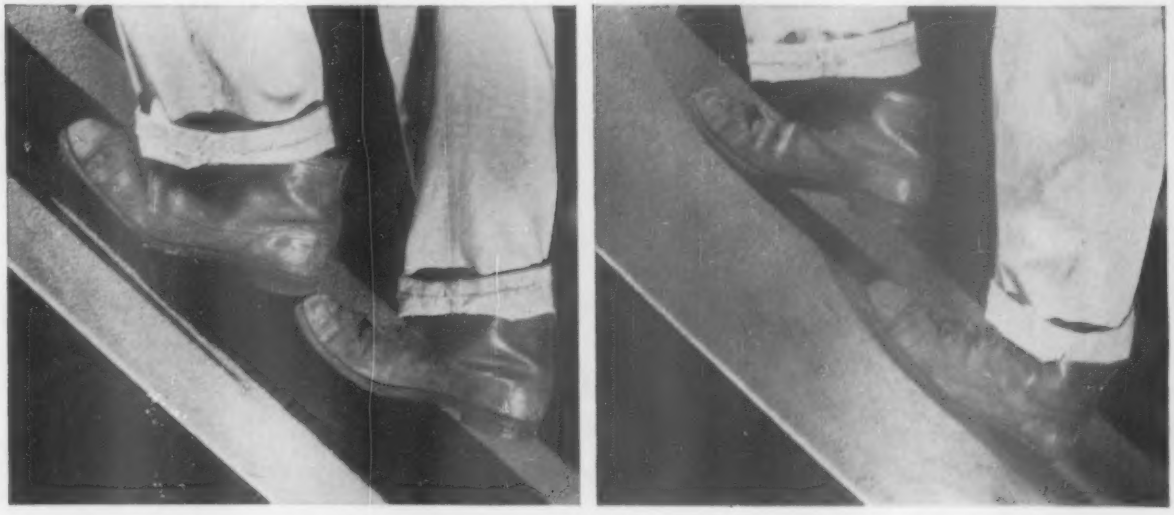
GROVE VALVE and REGULATOR COMPANY • 65th & Hollis Sts., Oakland 8, Calif.
HOUSTON 4—1901 Calumet St. • • • • • **LOS ANGELES 6**—1930 W. Olympic Blvd.

ODESSA, TEXAS • TULSA, OKLAHOMA • DENVER, COLORADO • In Western Canada: GROVE VALVE LIMITED

GROVE
SIMPLICITY
ACCURACY
SAFETY

NEW ALCOA ABRASIVE ALUMINUM TREAD PLATE MEANS SAFE FOOTING!



slip-proof under oil or water films on inclines up to 30°

Now you can eliminate lost man-hours from slip-slide accidents on oil- or water-covered walkways, ramps and ladders. New ALCOA® Abrasive Tread Plate is slip-proof! Made of a tough aluminum alloy, it has slip-proof aluminum oxide rolled right into its surface. That means safe, sure footing even when this new tread plate is covered with oil or water and inclined at angles up to 30°.

Like all aluminum products, new ALCOA Abrasive Tread Plate cannot rust . . . won't corrode in atmospheres normally corrosive to most metals. One-third the weight of steel, it's light and easy to handle. It's easy to fabricate and comes in standard sizes and thicknesses.

If slip-slide accidents are a problem in *your* plant, solve it once-and-for-all with ALCOA Abrasive Tread Plate. Use it for all your walkways, ramps and ladder treads! See your nearby ALCOA distributor or use the handy coupon for full details.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Mail this for new free book on Alcoa Abrasive Aluminum Tread Plate

Aluminum Company of America
904-M Alcoa Building, Pittsburgh 19, Pa.

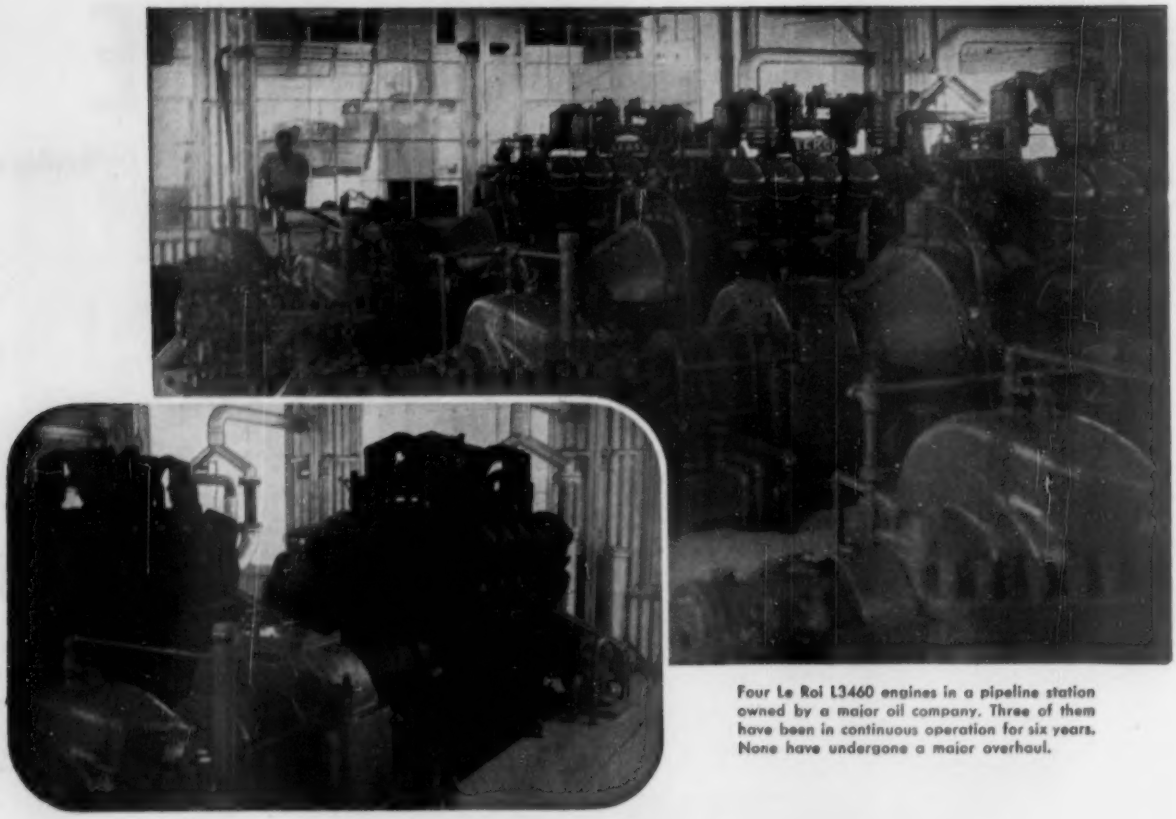
Gentlemen:
Please send me your new 8-page booklet, *Alcoa Abrasive Tread Plate.*

Name _____ Title _____

Company _____

Address _____

City _____ Zone ____ State _____



Four Le Roi L3460 engines in a pipeline station owned by a major oil company. Three of them have been in continuous operation for six years. None have undergone a major overhaul.

Power-Packed Pipeline Station

. . . uses Le Roi L3460's to provide plenty of low-cost pumping power

Le Roi's L3460 with 600 max. hp. and its bigger brother, the L4000 with 655 max. hp., are ideal for pipeline service on many counts. Here's why:

Plenty of power with good fuel economy—These engines develop 600 and 655 max. hp. with rock-bottom fuel consumption, and can be run on natural gas, gasoline, or butane. Advanced design manifolding, low friction bearings, and low power loss to accessories, all contribute to unusual operating economy.

Long engine life—Perhaps the best proof of this statement is found in the trouble-free performance experienced by users in installations like the one shown above. Basically the L3460 and L4000 are compact, high-output engines designed with short stroke to give you greater horsepower and speed, without compromising engine life. And that's exactly what they do for you.

More comfortable operating conditions—Water-cooled exhaust manifold cuts down engine heat in operating areas, yet provides fast engine warm-up. The smooth, clean lines of these engines prevent dirt from collecting —that's why they are so easy to keep clean.

Compact V-12 design packs a lot of horsepower in a small space—to give you more horsepower per dollar. This, plus vibrationless performance, reduces foundation costs, simplifies installation.

We think that if you see an L3460 or L4000 in operation you'll agree that they provide the answer to low-cost pumping power. Have your supply house or Le Roi distributor show you one at work. Bulletins are available upon request—just write us.

P-160

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 1, Wisconsin

PORTABLE AIR COMPRESSORS

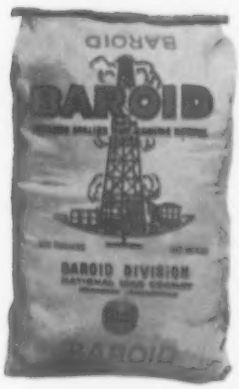
TRACTAIR

STATIONARY AIR COMPRESSORS

AIR TOOLS

ENGINES

When you buy Baroid — you buy the best!



you buy one— you get FOUR

Only Baroid gives you so much for your mud dollar. Service begins with an engineered mud program before you drill.

During operations, Baroid's 24-hour service speeds drilling, prevents trouble, and saves you money.

Complete well reports are filed at Baroid Area Headquarters for planning your future mud programs.

Mud that costs you less is mud backed by the best service — Baroid service. Your total mud program works better, saves you money when you use Baroid all the way. Baroid area headquarters give you fast, complete, localized service. Your best mud buy is BAROID!

BAROID

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5609

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For preventing or curing lost circulation, nothing equals FIBERTEX...continuously and scientifically improved to seal thief zones. FIBERTEX outsells all other lost circulation materials because it securely seals against the formation; doesn't clog or abrade pumps. Don't waste time experimenting ... use FIBERTEX first!

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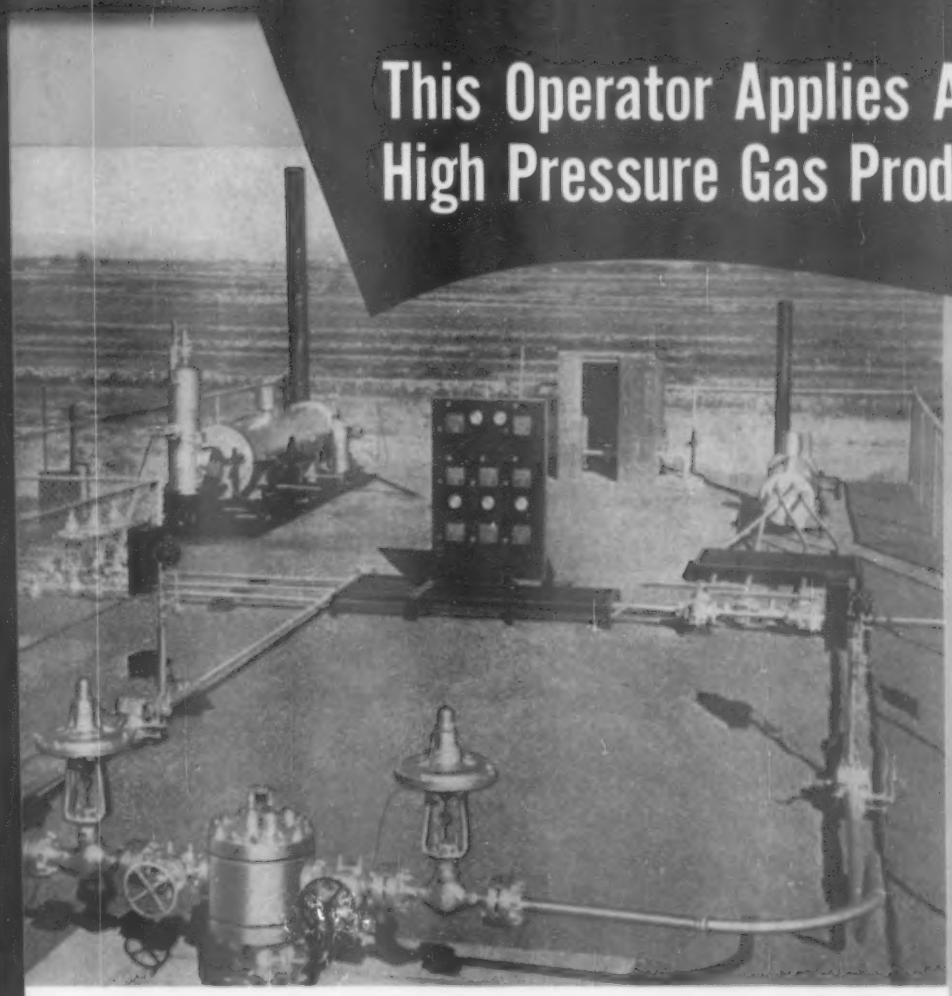
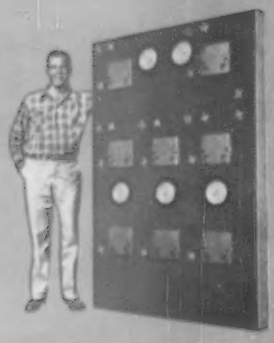
8910

This Operator Applies Automation To High Pressure Gas Production With...





The "heart" of the control system is the automation panel pictured above, from where a single operator can control with maximum safety the three variable pressured production zones ranging from 2,000 to 3,000 psi. These controls, which are tied into other BS&B lease production equipment, perform the following functions:

1. Controls minimum back pressure on all wells.
2. Automatically controls production rates to meet sales line demand.
3. Automatically shuts in well at Xmas tree in case of line or equipment failure.
4. Maintains (within the limits of the wells) the required 700 lb. sales line pressure, with less than 10 lbs. deviation.
5. Controls off and on sequence of the three wells.
6. Controls within 3° F. the sales line and liquid separator temperatures.
7. Extracts maximum liquid and solids from gas stream by separating at well head pressure, and by maintaining close control of separator temperature.

BS&B *Automatic Controls!*

When Operator Richard S. Rheem brought in the North Beehive Bend Field near Willows, California, he took into consideration all of the following factors before selecting BS&B Automatic Controls and engineering services to aid in the design and manufacture of California's first completely automatic installation for controlling the combined production of three high pressure gas wells:

1. Low cost.
2. High efficiency.
3. Versatility.
4. Unitized equipment for ease of installation.
5. Automation and simplicity of operation by one gas production operator.
6. Maximum safety for wells and personnel.

If you have a similar production problem — or one that is entirely different — why not put it squarely up to your BS&B Man? He'll be glad to help put your lease on the most efficient and profitable operating basis!

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Div., Dept. 1-A12A
P. O. Box 1714
Oklahoma City, Oklahoma

Horse Sense about

straight from the horse's mouth

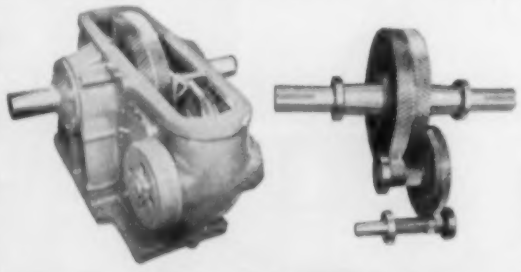
"My name is

EMSCO"

"Thousands and thousands of my brother pumping units have been bred in the EMSCO barns and put out to do a job in the oil patches of the world. We are work horses and many of us lift our heads 1½ to 5 million times a year depending on how much our master works us — without complaining. No wonder you'll find oil operators everywhere patting us on the head 'cause we're their pets.

"One reason they like us especially is our patented counterbalance which can easily be adjusted by one man working at ground level. These time-saving, wing-type counterweights pivot from the crank arms and move on semi-circular tracks. All loading is done from a pivot point and not on the track face, permitting the counterweights to move free and easy.

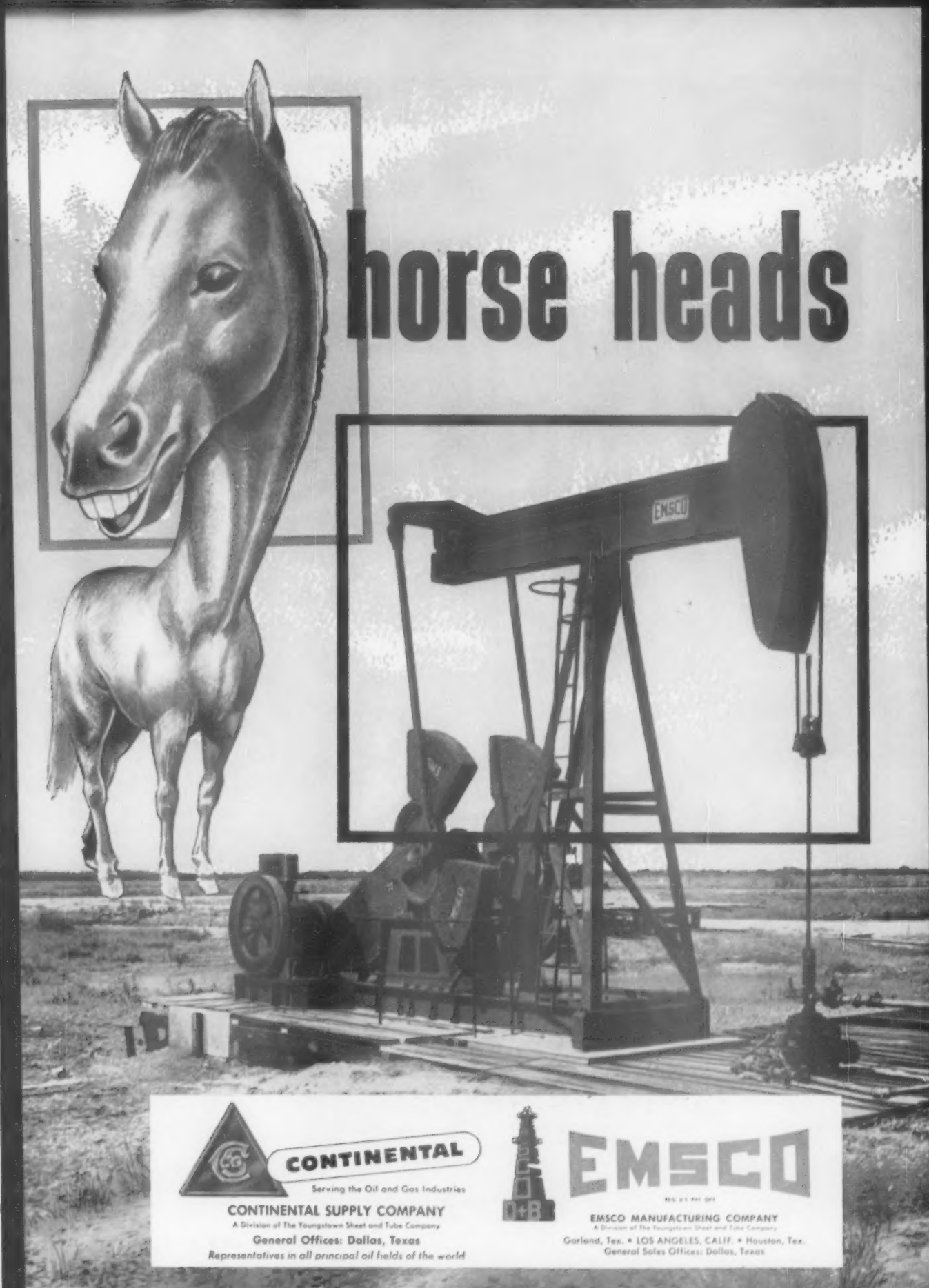
"Why don't you learn more about us?
Send for a colorful bulletin or get
full details from CONTINENTAL."



API Pumping Unit Gear Reducer

A new gear train arrangement gives better distribution of bearing loads, greatly increasing the life of the pumping unit. The gear train assembly is mounted in a rigid, one-piece housing – there's no split across the bearing bores to cause possible bearing distortion. Precision machined shaft openings assure perfect gear train alignment. Lubricating oil level permits the slow speed and intermediate gears to dip into oil. A combined wiper and trough system collects the oil and directs the flow to each bearing.

PT-601



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Representatives in all principal oil fields of the world

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LOOK FOR THE
JENKINS DIAMOND

PROTECT YOUR VALVE INVESTMENT

Specify — and be sure you get

JENKINS

Renewable Composition

DISCS

MADE BY THE ORIGINATORS OF RENEWABLE DISC VALVES

Jenkins Bros. has remained the leader in composition disc development and production since 1864, when the first renewable disc valve was introduced.

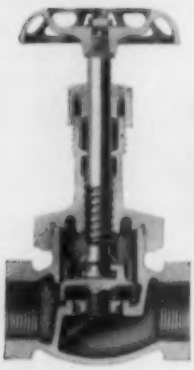
THE ONLY MANUFACTURER OF BOTH VALVES AND DISCS

Jenkins Bros. devotes continuous laboratory and field research to disc improvement through use of new compounds, and new production techniques.

NEW GUIDE FOR DISC SELECTION

Describes all Jenkins Discs, and their applications for steam, hot and cold water, air, gas, oil, gasoline . . . including the new TEFLON® DISC for lasting, dependable control of oxygen and other gases, solvents, acids, alkalies, and other chemicals,— and for liquid food and similar services.

Ask your Jenkins Valve Distributor for Disc Folder Form 203, or write: Jenkins Bros., 100 Park Ave., New York 17.



. . . for highest efficiency, use the time-proved combination . . . JENKINS DISCS in

JENKINS VALVES

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Jenkins Bros.

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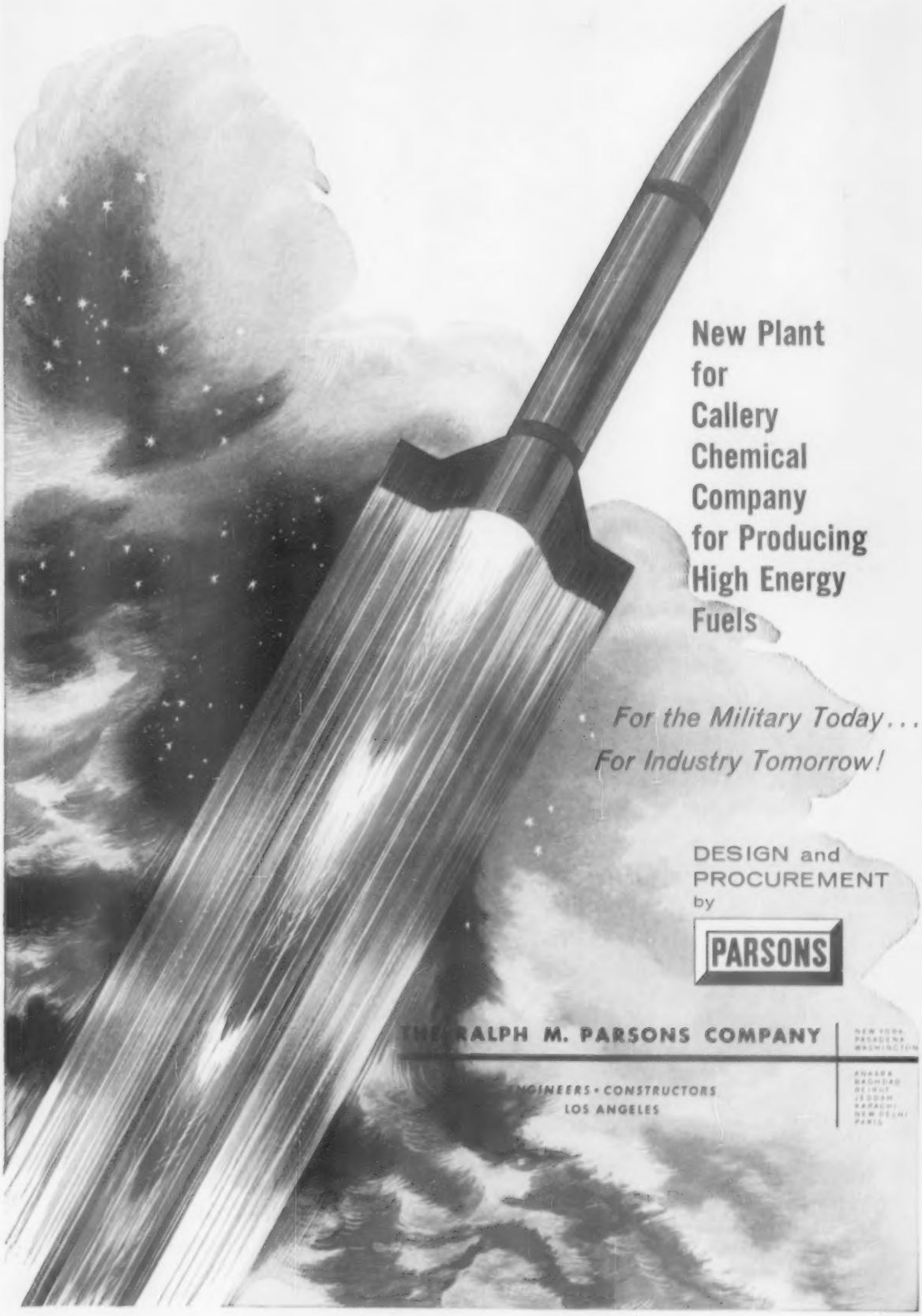
New Plant
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Callery
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High Energy
Fuels
For the Military Today...
For Industry Tomorrow!
DESIGN and
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by
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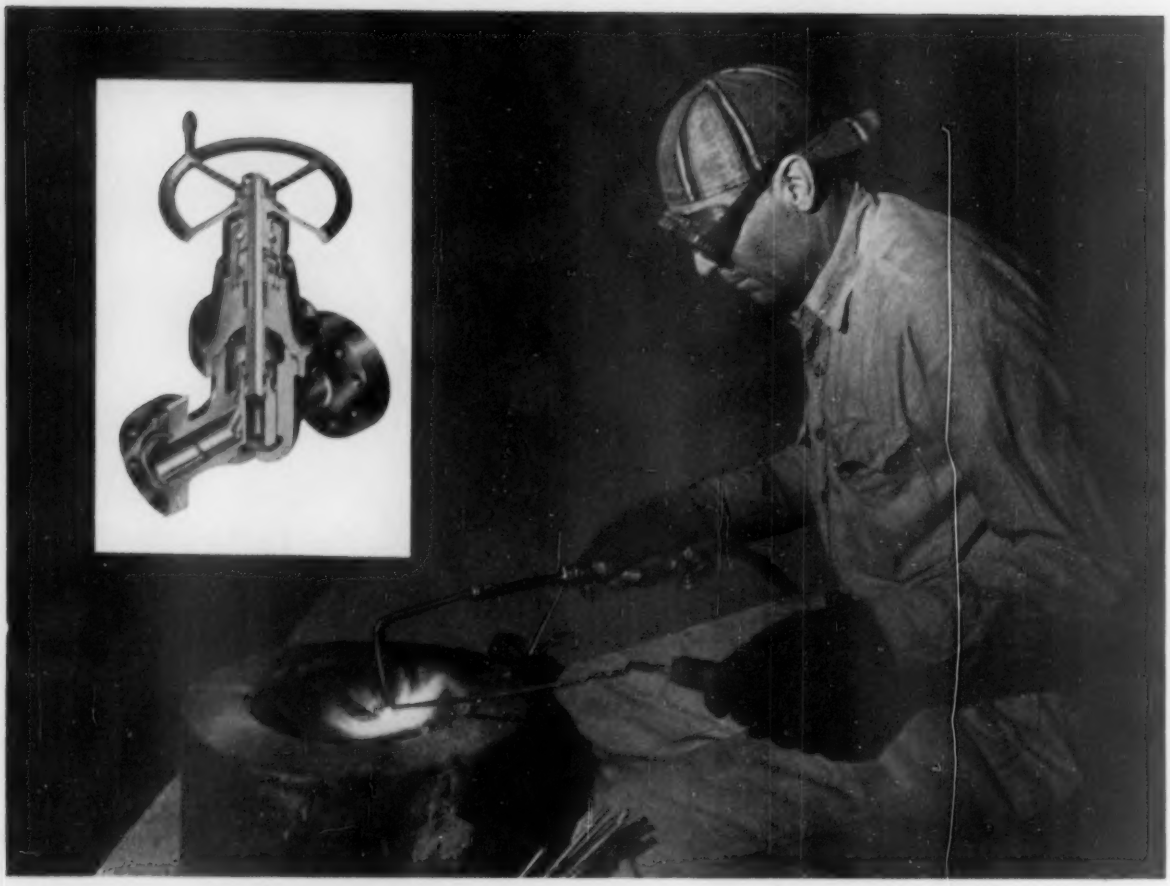

Hard Faced, Metal-to-Metal Seal In BIW Non-Lubricated Gate Valve

The entire design of the BIW valve means ease of operation, lower cost of maintenance and longer operational life. The simplified design of the BIW valve is your assurance of long valve life.

The BIW valve seals positively without lubricants. The seating surfaces on both the gate and the seats are faced with a hard, stainless, non-galling alloy. Extensive field service in over 35,000 installations has proved this alloy to be highly resistant to erosion and corrosion.

The hard-faced gate and seat, because of their resistance to wear, make a positive seal for years to come. The BIW valve closes tightly without a lubricant and eliminates the expensive man-hours required for valve lubrication.

Easy opening and closing under pressure is provided by the rugged, heavy-duty steel ball-bearing stem thrust of the valve. The external location of the ball thrust-bearing protects it from possible injury by corrosive well fluids.

Look into the BIW valve. ALCO specialists are available to consult with you. Oil Tool Sales Office, 1404 Dunlavy, Houston 19, Texas, phone JAckson 9-4221.

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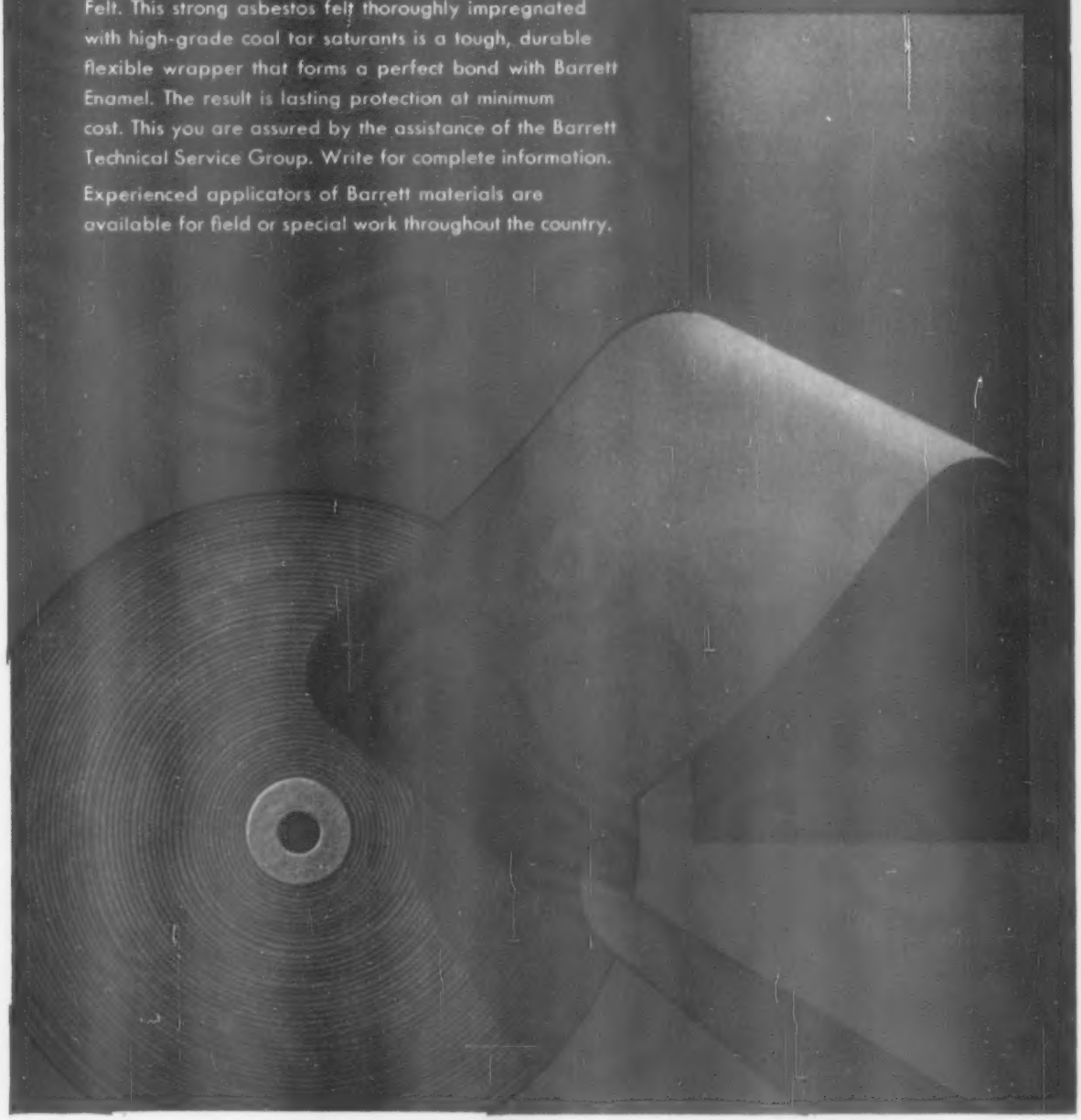
ALL-AROUND PROTECTION

You get all-around pipe protection with Barrett Pipeline Felt. This strong asbestos felt thoroughly impregnated with high-grade coal tar saturants is a tough, durable flexible wrapper that forms a perfect bond with Barrett Enamel. The result is lasting protection at minimum cost. This you are assured by the assistance of the Barrett Technical Service Group. Write for complete information.

Experienced applicators of Barrett materials are available for field or special work throughout the country.



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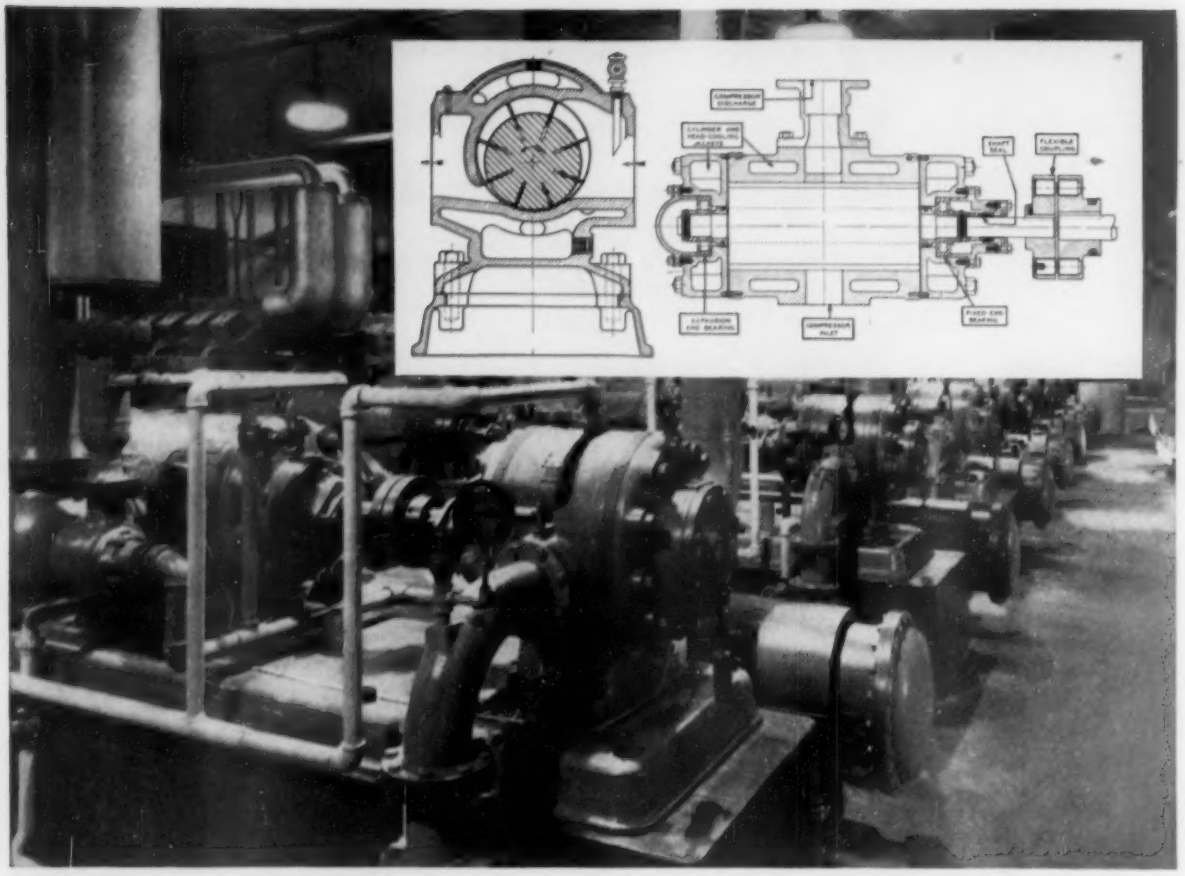
PROTECTIVE COATINGS

BARRETT DIVISION, Allied Chemical & Dye Corporation, 40 Rector St., N. Y. 6, N. Y. In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

OVER 100 YEARS OF EXPERIENCE

Allied Chemical



HERE ARE 7 FULLER ROTARY COMPRESSORS

. . . in *any* quantity they are an investment in dependability

The wide and continuing acceptance of the Fuller Rotary Compressor in the petroleum industry is based on a number of unique design features, eminently suited for gas gathering and boosting in any rugged situation. Indoors or out, its trouble-free operation makes for minimum maintenance and operating costs.

There are 8 good reasons why the Fuller Rotary Compressor enjoys such widespread use—they may easily serve as reasons why your next compressors should be Fuller Rotaries.

1. SIMPLICITY—Elimination of compressor valves, crankshafts, pistons and other moving parts greatly reduces the need for attention, adjustment and replacement. 2. PULSATION-FREE FLOW—Rotary compression eliminates pressure fluctuations and simplifies metering problems. 3. SUSTAINED PERFORMANCE—Blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new-machine efficiency and capacity. 4. NON-VIBRATING—Rotary principle permits a design completely free of reciprocating parts, avoiding basic cause of vibration.

5. COMPACTNESS—Large capacity in relation to size results in lighter weight, compact, transportable units. 6. EASE OF INSTALLATION—In smaller sizes, no foundation is needed. Larger units need only concrete slab for foundation. Automatic safety controls are incorporated in package. 7. ECONOMY—Few moving parts of the compressor, and their accessibility, reduce maintenance to the minimum. 8. VERSATILITY—Unit can be operated at various conditions. Capacity variation of 50% can be obtained by change of speed with engine, turbine, or two-speed motor drives.

We'd like to send you fully-descriptive Fuller Compressor literature. It's yours for the asking.

FULLER COMPANY
132 Bridge St., Catasauqua, Pa.
A SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORP.
Chicago • San Francisco • Los Angeles • Seattle • Kansas City • Birmingham

C-287
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everywhere . . . the change is to

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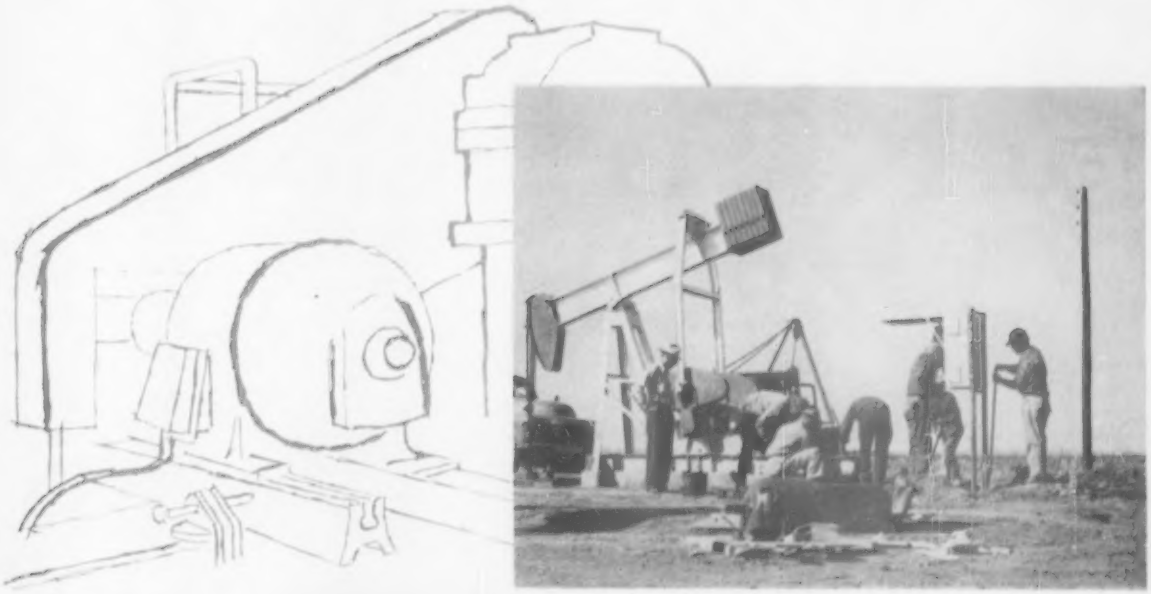
Today, your Utility Electric Power Company offers even greater service at a lower cost than ever before! ECONOMY — *PEP cuts down installation, operating, mainteance, and labor costs! CONVENIENCE — With PEP you have constant, dependable service, automatic controls, and a more satisfactory trouble-free operation. Yes, everywhere . . . the change is to low cost Electric Power . . .

*Purchased Electric Power

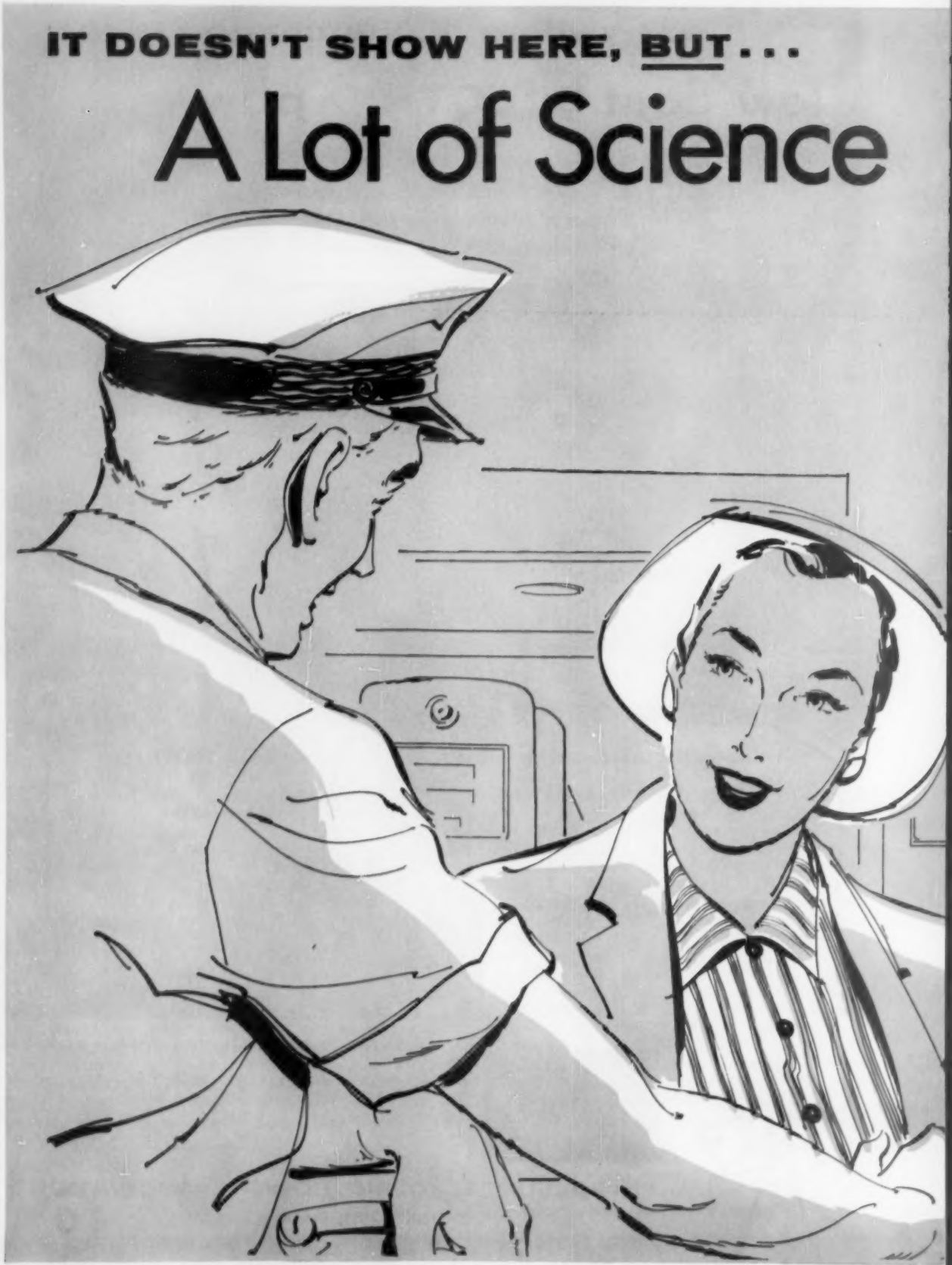


Above an actual switch is being made to Electric Power.

Call your power company for details on how *PEP can serve you.

PETROLEUM ELECTRIC POWER ASSOCIATION

P. O. Box 2771, Dallas, Texas


IT DOESN'T SHOW HERE, BUT...
A Lot of Science

Went Into This Sale!

In this business of providing the motoring public with the best possible motoring fuels we recognize that there is no substitute for strong, creative selling, both at the wholesale and the gas station levels.

To implement this selling, it is equally important that the manufacturing end of this industry produce a product that meets the exacting demands of today's powerful automotive engines. Thousands of skilled scientists and researchers are at work throughout the petroleum industry to provide these super motor fuels.

The research and engineering staffs here at Universal are part of this team of men of science. Through some forty years they have pioneered in the development of fundamental petroleum refining processes, making them available to refiners large and small, everywhere.

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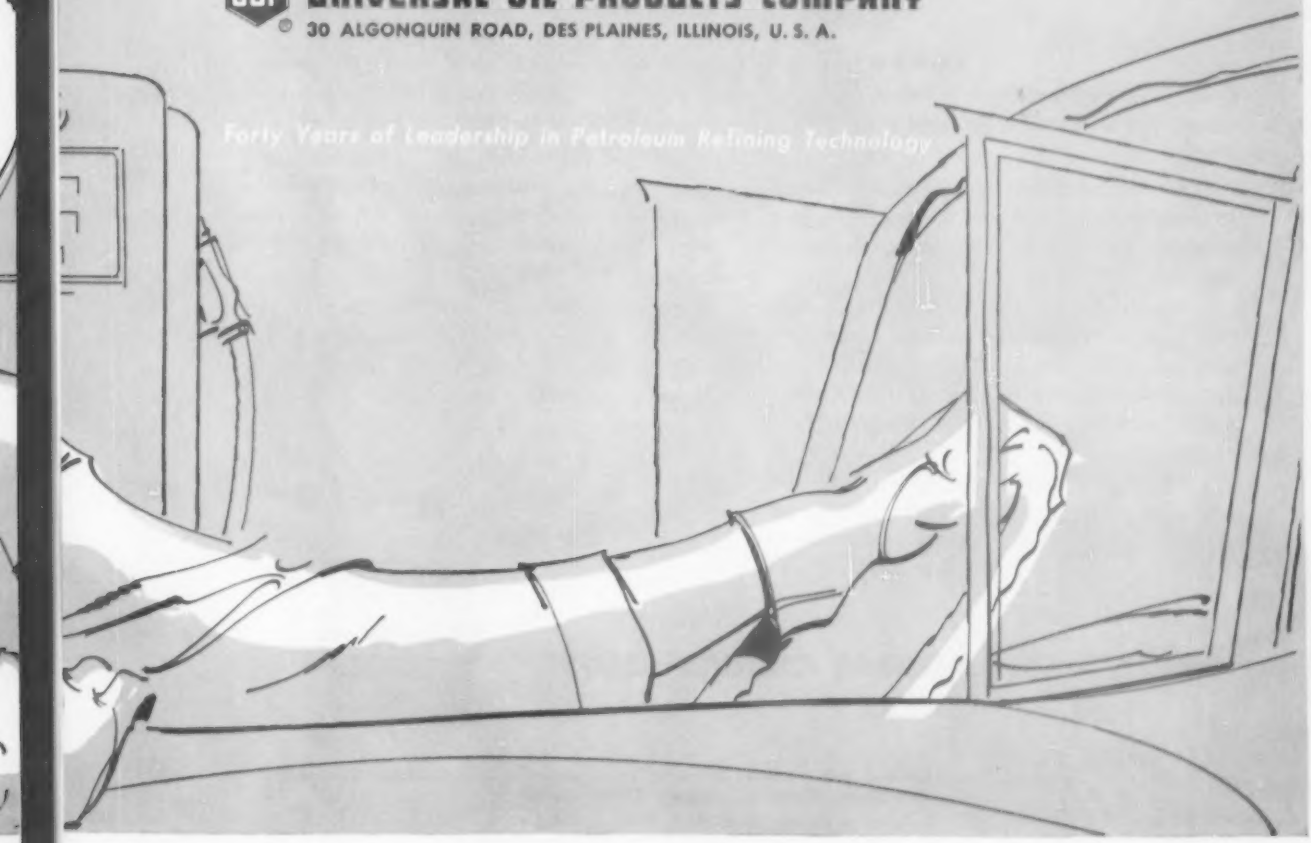
UOP has prepared an interesting booklet on "How Men of Science Help You Sell". We'll be glad to send you a copy on request.

UOP **UNIVERSAL OIL PRODUCTS COMPANY**
30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U. S. A.

Forty Years of Leadership in Petroleum Refining Technology



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On the WESTERN front – the progress front – things are never quiet. For at Western, progress is the watchword.

Western engineers are constantly at work to bring to the oil industry the most advanced products in logging, perforating, fracturing and acidizing.

Western progress today is symbolized by two new developments in engineered well services – Rocket J-II "all hole – no carrot" Jet perforating and Perforation Ball Sealers, a great new step in controlled fracturing and acidizing.

Perforation Ball Sealers bring complete treatment of the entire perforated section on ONE set-up. Their ball-valve action temporarily seals off the most permeable zone to divert treating fluids into the tighter zones for more effective treatment.

Rocket J-II perforating gives completely unobstructed perforations for more effective penetration and an amazing 5/8 inch diameter entry hole – proved by independent tests.

Rocket J-II and Perforation Ball Sealers are just two of the many examples of Western's engineered well service program. At Western, progress is an every-day fact – not just a word.

Go with progress – GO WESTERN – where well services are engineered for you.

THE WESTERN COMPANY

general offices: Midland, Texas

WESTERN Engineered WELL SERVICES

Texas: Odessa, Seagraves, Snyder, Lubbock, Borger, Rankin, Andrews
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large capacity portable meter calibrating tanks

Let our years of experience in the design and fabrication of these tanks help in your planning of meter calibrating tank installations.

Built to API code 1101 (tentative) and API-ASME codes. Corrosion resistant interior coatings available. Write for complete information.

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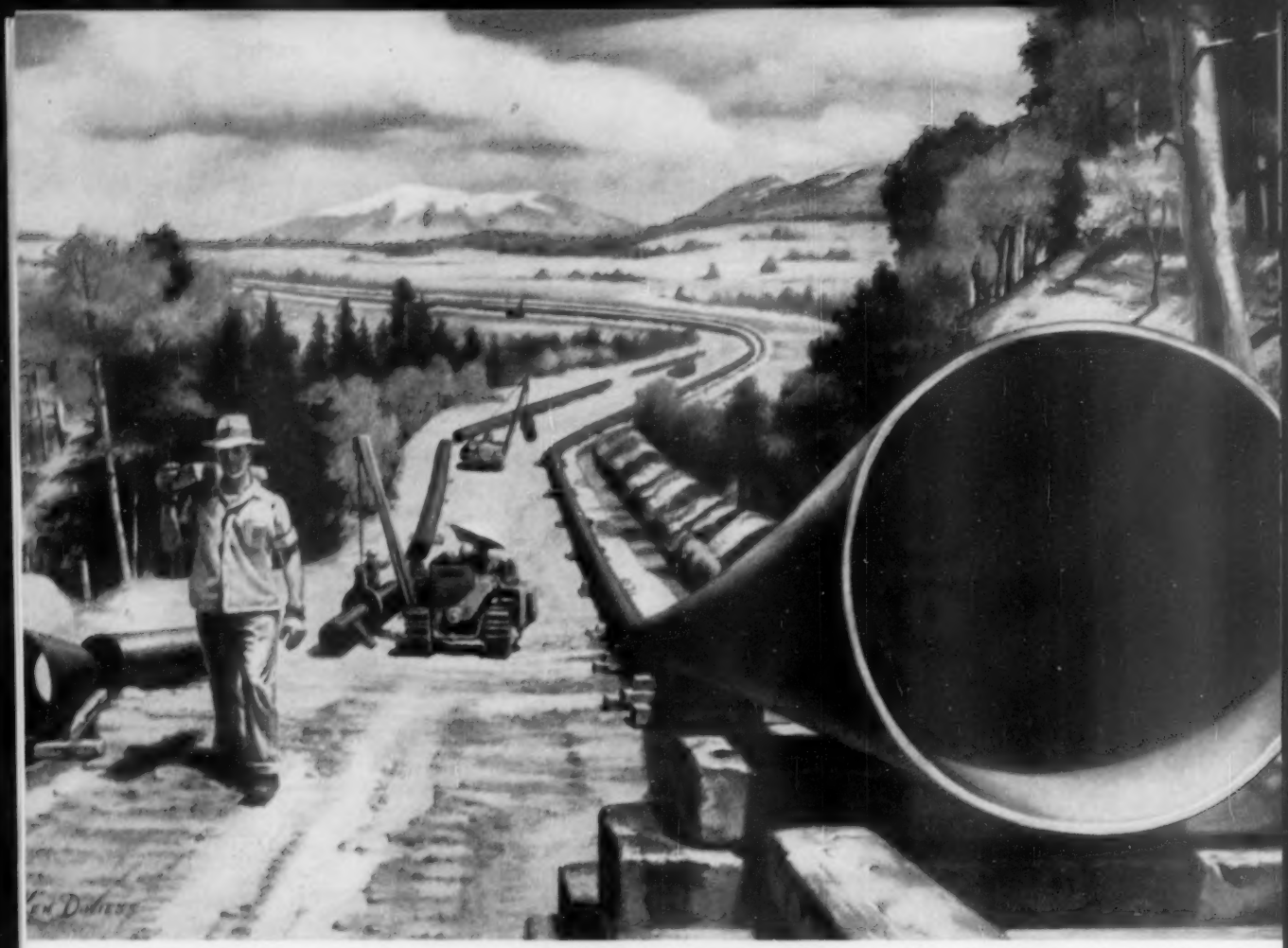
In Canada: FRAM CANADA LTD., Stratford, Ontario



Transcontinental pipelines are among the many places where Cathodic Protection and Anaconda Type CP Cable are used to check corrosion.

Cable that helps make the pipeline a good neighbor

To make cathodic protection systems more economical and effective – to help pipeline and oil companies check costly corrosion, stop leaks, make pipelines good neighbors – Anaconda offers a special Type CP Cable that *lasts far longer* on the job than ordinary cable.

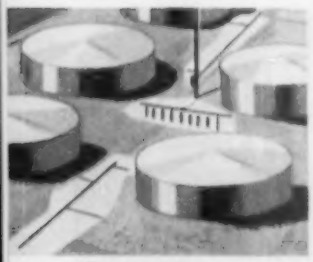
High-grade polyethylene insulation and tough Densheath* (PVC) jacket offer high resistance to electroendosmosis†, as well as high resistance to oil, moisture, and most acids, alkalies and chemicals found in corrosive areas. And rugged Densheath withstands toughest abrasion, moisture, sunlight and weathering.

For special applications, a one-layer insulation and jacket construction of polyethylene is available.

To order, or for more information—call the Man from Anaconda. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

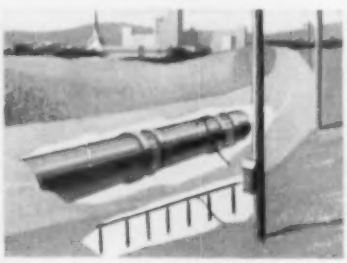
*Reg. U.S. Pat. Office †Cable failure on direct current in wet locations. 55557 Rev.

WHERE ANACONDA TYPE CP CABLE AND CATHODIC PROTECTION CUT CORROSION COSTS

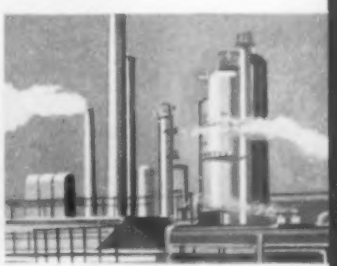


Tank farms

Underground storage tanks



Pipelines



Oil refineries

ASK THE MAN FROM **ANACONDA**

FOR **CATHODIC PROTECTION CABLE**

Not Just CORROSION-RESISTANT

BUT CORROSION-PROOF

Corrosion resistance is not enough to stop acids or alkalies from chewing up a motor in a hurry. That is why the wise engineer selects Reliance Corrosion-Proof Motors for corrosive service.

These motors are built to withstand the onslaught of destructive chemicals for years. Housings are made of virtually indestructible cast iron. Exterior contours are designed to slough off liquids—no nooks and crannies to retain corrosive elements. Enclosures are sealed to prevent any leakage . . . Metermatic lubrication systems provide complete protection against burned out bearings and contaminated lubricants.

Anyway you look at them, Reliance Corrosion-Proof Motors can take it—and you're not limited in the choice of motors either. A complete line of a-c. motors, 1 thru 300 hp., is available in all mountings, frequencies and voltages.

Why not call your Reliance representative today and get all the details.

B-1505

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RELIANCE ELECTRIC AND ENGINEERING CO.

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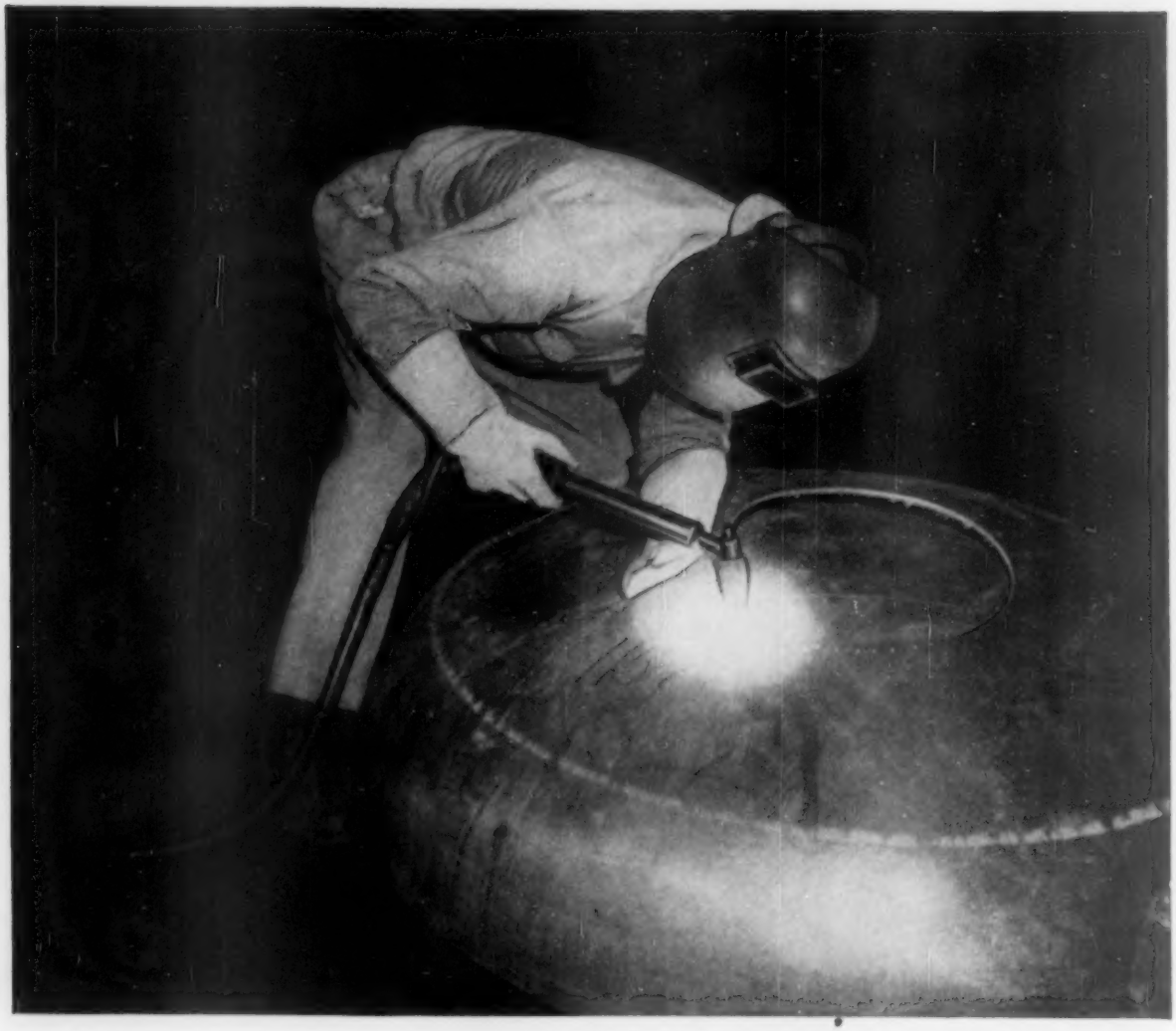

from one hour to one minute...

HELIARC Cutting Whizzes Through Aluminum

One of the first aluminum fabricators to use LINDE's new HELIARC cutting process reveals savings of more than 95 per cent over conventional chipping methods—jobs normally requiring 1 and 5 hours to complete are whisked through in only 1 and 4½ minutes respectively. Graver Tank and Manufacturing Company reports beveling, grooving, shaping, and cutting are all performed on ⅝-in. thick, 52S aluminum plate at substantial time, space, and cost savings.

Incredible, but true: HELIARC cutting can attain speeds as high as 600 inches per minute, and cut aluminum in thicknesses up to 1½ inches. No special skill is required. A certified welder can do excellent cutting jobs after less than one hour of instruction.

Get the full story on revolutionary new HELIARC cutting. Call your LINDE representative, or write for free illustrated literature, Form 50,095.

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In Canada: LINDE AIR PRODUCTS COMPANY
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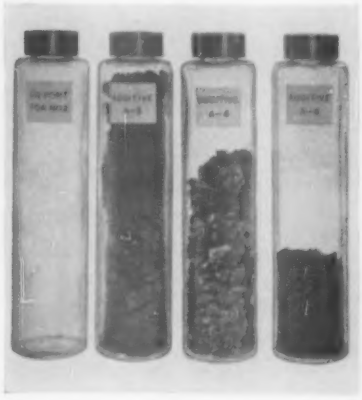
PETROLEUM CHEMICALS DIVISION
NEWS

December ★ One of a Series of Bulletins for the Petroleum Industry ★ 1956

You can SEE the advantage of using ASHLESS Du Pont FOA-2

When you burn 1,000 gallons of home heating oil containing a dispersant additive, how much ash does the additive leave?

That depends on the additive—as the picture below clearly shows.



These bottles (8 fluid-ounce size) contain the amount of ash left from burning four different heating oil additives.

The bottle on the left contains practically *no* ash, although enough *nonmetallic* Du Pont Fuel Oil Additive No. 2 (FOA-2) was burned to protect 1,000 gallons of fuel oil. (Actual concentration: 20 lbs./1,000 bbls.) The other bottles contain the ash left after burning cost-equivalent amounts of three metallic additives. The difference is so striking that comment seems superfluous.

Stack control failures

What damage do these ash deposits do in the burner system?

Many stack control failures can be attributed to metallic ash deposits on the helical coil. And such failures are likely to prove hazardous and result in needless, unprofitable service calls.

In rotary burners, metallic additives leave deposits on the flame rim and electrode. These tend to short out the electrode, causing ignition difficulties. And even if ignition is accomplished, the deposits on the rim will interfere with the progress of the flame around it.

In diesel fuels

When metallic additives are used to stabilize economy grade diesel fuels, there is a danger that these additives will contribute a sparking tendency to the fuel.

* * *

For more information about FOA-2, just address your request to our nearest sales office.

New dry-dye drumhead makes eduction faster and cleaner

Du Pont petroleum dyes are now being shipped in drums covered with newly designed steel drumheads, each having a 2-inch circular opening. Through this the dry-dye eduction probe can be easily inserted and manipulated.

NOTE HOW easily the dry-dye eduction probe can be inserted through the opening of this new-type Du Pont dye drumhead.

This opening is sealed with a plastic disc. When the dye is to be removed, the disc can be easily cut out with a penknife. (See cut on next page.)

The opening is rimmed with plastic which is threaded to accommodate a standard 2-inch pipe plug. That means easy re-sealing . . . to protect the quality which is built into all Du Pont dyes.

The new drumhead need not be removed. Using the small opening instead reduces dusting to an absolute minimum. When the eduction probe is inserted, little open space is left around it. Hence little, if any, dry dye will

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

OVER

DU PONT

PETROLEUM CHEMICALS DIVISION
NEWS

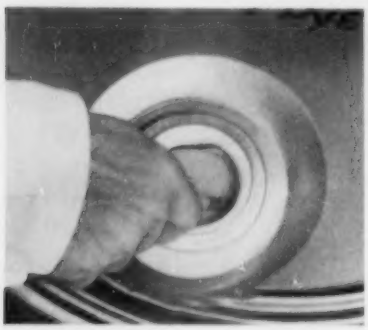
DU PONT

CONTINUED *New dye drum*

emerge, except as desired—through the probe itself.

Second recent improvement

The new drumhead follows by only six months another radical improvement in dry-dye eduction procedure—the new probe that is virtually clog-proof. More than 100 are now in service, and the demand for them continues.



FOR SHIPPING, the small opening is sealed with a plastic disc which can be easily cut out with a pocket knife.

Any of our sales offices listed below will be glad to give you complete information on the new dye drums and eduction probe. If you are not now using the dry-dye eduction system, our Operations Group will be glad to help you set up the complete installation.

A STANDARD 2-inch pipe plug keeps the dye drum tightly closed once the seal has been broken.

ASSISTANT MANAGER OF OPERATIONS

RUSSELL B. DAVIS has been attached to the Operations Group of the Du Pont Petroleum Chemicals Division since 1947. He currently supervises the work of this group, whose chief concern is to help refiners maintain safe, efficient handling of tetraethyl lead and other additives.

His contributions to safer TEL handling and more efficient plant operations in connection with the use of additives have been many. He played an important part in the development of such Du Pont-designed equipment as the metal-flex unloading hose, the siphon starter and the new, non-clogging dry-dye eduction probe.

After joining the Du Pont Company in 1933, his first assignment was in the Rayon Department. He was later transferred to the Engineering Department. From 1936 to 1947; he held a number of manufacturing positions in the Organic Chemicals Department, mostly connected with TEL manufacture.

Mr. Davis received his Mechanical Engineering degree from Rensselaer Polytechnic Institute. He is a member of the American Petroleum Institute, the National Safety Council and Sigma Xi Fraternity.

NEW DYE BOOK AVAILABLE

Gives detailed information on coloring all types of petroleum products

With the public becoming more and more color-conscious every day, refiners and marketers are putting increased emphasis on coloring all types of petroleum products.

Gasolines have been dyed for many years to indicate TEL content—also for brand identification. However, only recently have brilliantly hued greases, lubricating and home heating oils, kerosines and diesel fuels begun to appear. The merchandising advantages of using eye-appealing color for brand identification are no doubt an important reason for this trend.

To help refiners use petroleum dyes as effectively and economically as possible, we have just published a new manual on coloring petroleum products. All the latest methods of addition—including dry-dye eduction—are covered in this 20-page book.

It also contains data on meeting color requirements for military, aviation and leaded motor fuels. And full information on Du Pont Petroleum Dyes—with solubility charts and spectrophotometer curves—is included.

Just address your request for this book to one of our Petroleum Chemicals Division sales offices. Ask for a copy of "Du Pont Petroleum Dyes."

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Better Things for Better Living
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Petroleum Chemicals

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Just delivered to Cabot Shops, Inc. of Pampa, Texas—loaded down with pumping units and ready to go. **Cabot chose this Mack Thermodyne® Diesel because it's . . .**

. . . "best for heavy hauling!"

. . . best for Cabot's operation of supplying vital machinery to drilling and production crews—when it's wanted and where it's wanted. Over the highway, back country roads, or over roadless terrain to remote drilling locations—regardless of the route, Cabot's customers depend upon prompt delivery . . . and Cabot Shops, like so many oil field operators, have found that they can depend upon Macks. Rigs, cementing units, draw works, casing, boilers, power units—whatever the job, Macks, with their unmatched ability for handling heavy loads over all terrain, can do the hauling economically and on schedule.

Why not find out for yourself how dependably and economically Macks can work for you—transporting heavy loads to drilling locations. Let your local Mack representative give you the complete story. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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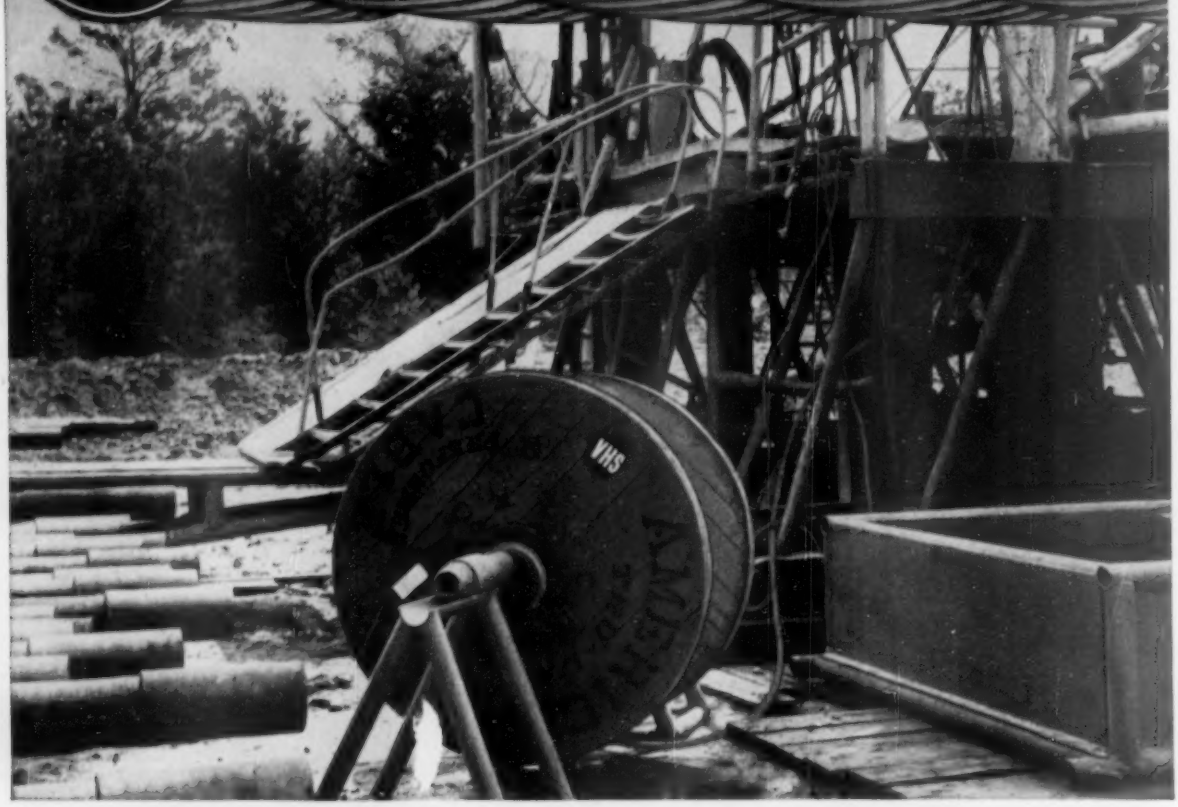
American Cable TRU-LAY VHS | 15% STRONGER



This Reel Means Safer, Faster Drilling

You're seeing this reel, with its proud VHS label, at more and more rigs in every section of the oil country. For drillers are learning that new VHS rotary lines, made from a new grade of steel for Wire Rope, possesses important advantages.

To begin, VHS is at least 15% stronger than Improved Plow Steel—the best grade available, before VHS.

Higher Safety Factor

This additional strength means a higher safety factor. For example the safety factor for 10 lines of VHS is about equal to the factor of safety for 12 lines of IPS. Or, the factor of safety for 10 lines of VHS is 14.9% or 15% higher than for 10 lines of IPS.

Drill Faster—Cut Down Time

With stronger VHS you can drill deeper before increasing the number of parts of line. You can make round trips faster. And VHS's extra strength eliminates, in many cases, any necessity for regrooving sheaves or buying new blocks to use larger diameter lines for higher safety factors.

Tougher, Too!

VHS is not only stronger, it's tougher. And this combination of extra strength and toughness gives it higher resistance to abrasion and greater resistance to peening . . . both important factors in maintaining rope diameter and shape. If regular adaptable cut off practices are followed, ton mile advantages should result.

Easy to Order

To order VHS drilling line just call your nearest Mid Continent Supply Store and tell them the length and diameter you want. No complicated specifications needed.

For further information write to the nearest American Chain & Cable Company office listed at right for

Brochure DH-516H

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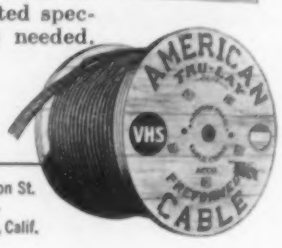

BOUGHT 40 MORE

Since he first switched to GM Detroit Diesel Power

Back in 1947, Calvert Drilling, Incorporated, started operations with three gas-powered rigs. They promptly switched one rig to General Motors Detroit Diesel power, found this quick-acting, 2-cycle Diesel gave them faster round trips, easier moves and more dependable parts and service availability wherever they went. Now the company has standardized on GM Detroit Diesel power in all their 13 rigs as well as trucks and lighting plants.

Does it pay to standardize on GM Detroit Diesel power? It sure does. For it simplifies your servicing and parts requirements. And you get easier, faster moves *plus* faster, lower-cost drilling, too.

You can get GM Detroit Diesel power (single engines, 30 to 300 h.p.; multiple units, up to 893 h.p.) in over 1,000 different applications of power machinery and boats of all types. For the list, see your local GM Detroit Diesel distributor or dealer.

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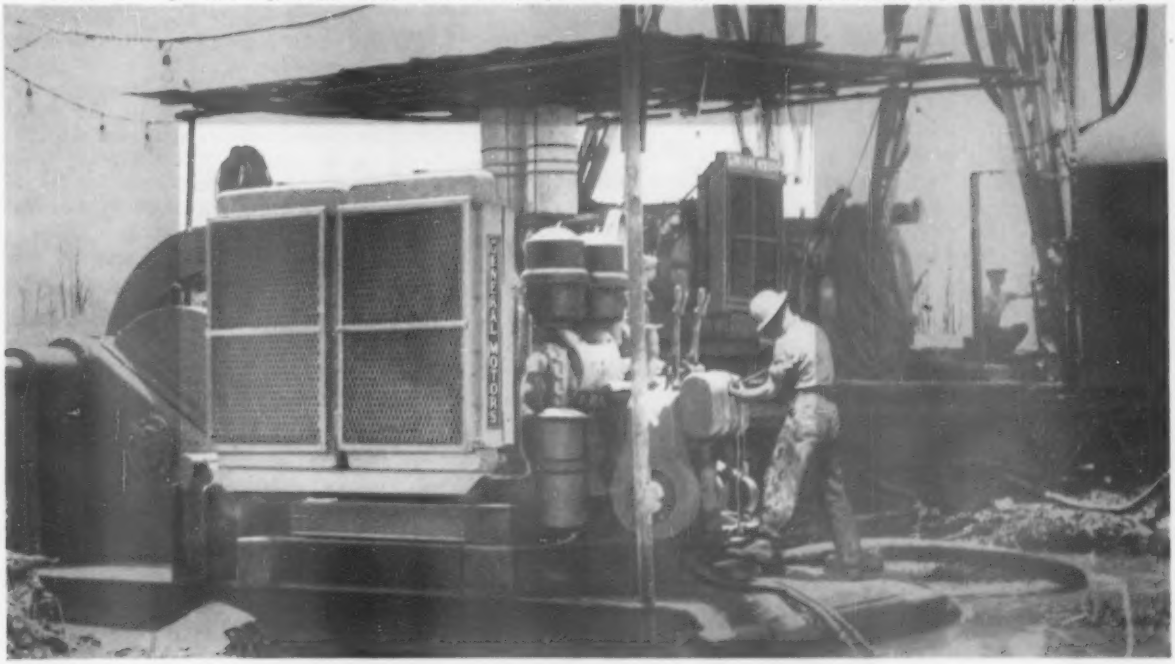
Calvert Drilling, Inc., Olney, Ill. GM "6-110" Diesel drives Hydrair draw works, "Twin 6-71" powers Gardner-Denver mud pump.



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London, Ontario

We're building again . . . in order to give our friend, Joe Roughneck, faster service on API casing, tubing and line pipe.

When Lone Star Steel's fifth open hearth furnace is completed, production of steel will be increased 25 per cent. More, our new pipe mill facilities will mean an increased supply of urgently needed tubing.

Yes, Joe Roughneck . . . heart of the oil industry . . . can depend on Lone Star Steel. Lone Star is dedicated as a major supplier to the oil and gas industries.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.

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They Say—

Beginning in the Red

"In view of the rapid rise in highway construction costs it's widely agreed that the estimates supporting the barely started federal interstate network are hopelessly inadequate already.

"The parent program and the motor-use taxes that are supposed to finance it are based on 1954 construction costs. But now it's feared that the 41,000-mile interstate network eventually may cost more than twice the $27.5 billion estimated earlier.

"Accordingly, there will have to be a further increase in federal motor-use taxes if the program is to be kept on a pay-as-you-go basis. But until Congress has a more up-to-date cost estimate, it won't know how high it will have to raise taxes. So, the Bureau of Public Roads has undertaken a new cost survey.

"The final results of that survey won't be available until 1958. But if costs advance as much in the next 2 years as they have during the last 2 years that survey may be obsolete by the time Congress gets it. In that event, Congress could do only what it did when it enacted the present program. It could impose a tax increase based on a cost estimate it knew to be unrealistic at the time. In doing so it would be laying the basis for an inevitable further increase in taxes at a later time."

Editorial in the Oklahoma City Daily Oklahoman.

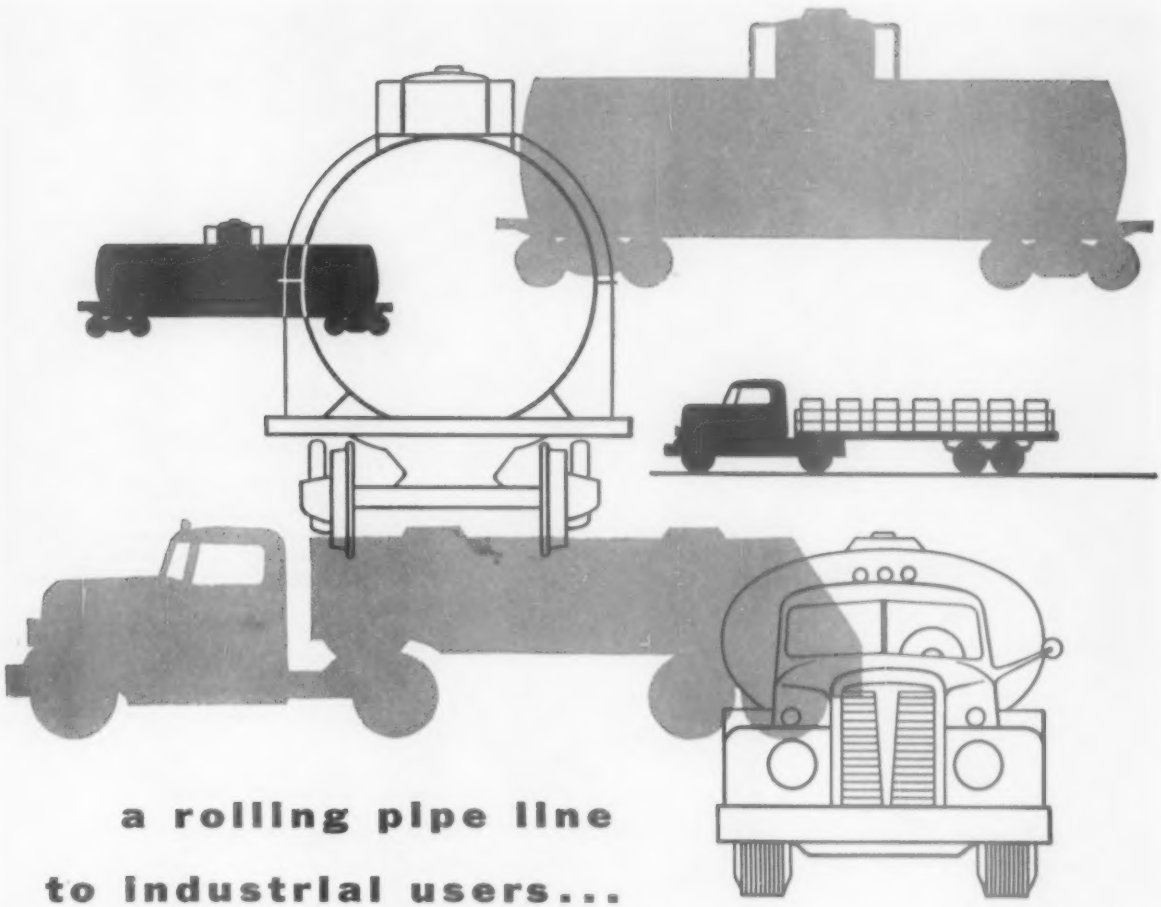
Seaton Looks Abroad

"Some of you believe that the security of the United States can be assured only by complete self-sufficiency—that there neither is nor can be any security in foreign oil. Certainly, the record of history requires us to carefully examine this appraisal.

"Repeatedly we nave allowed ourselves to become dependent upon other nations for tungsten, manganese, potash, and many other metals and minerals only to find ourselves cut off from these supplies or greatly restricted in their availability during an emergency.

"For many materials, however, some answer other than self-sufficiency must be found. The costs of achieving self-sufficiency . . . would be great—greater perhaps than we want to assume, or even could afford.

"It would be next to impossible to achieve self-sufficiency—regardless of



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Fast deliveries, straight from plant to you, guarantee that Mathieson mono-, di-, and triethanolamine reach your process in the original containers. There's no repacking or rehandling to impair the purity of these Mathieson products.

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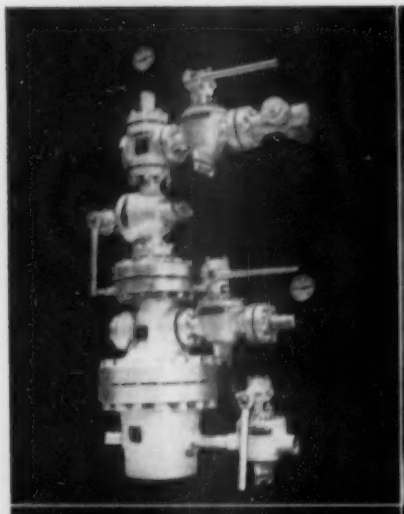
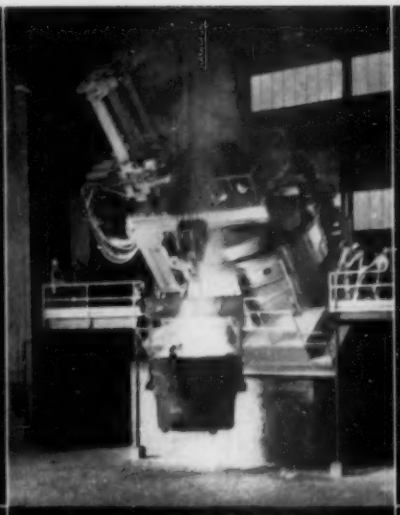
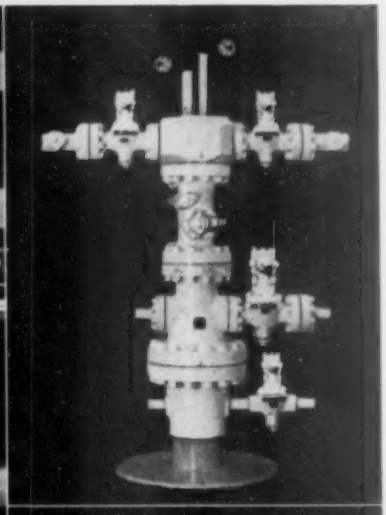


Cameron forged steel Christmas Trees are available to meet any requirement.

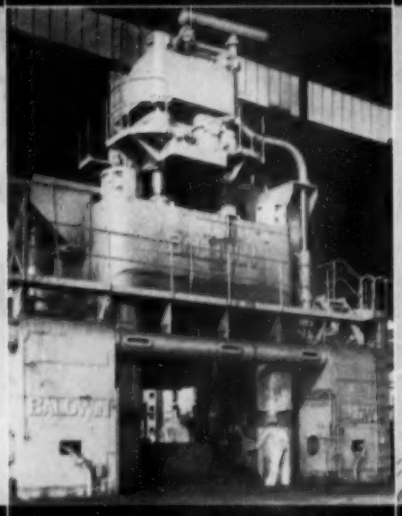


One of Cameron's 25-Ton Electric Melt Furnaces producing high quality alloy steel.

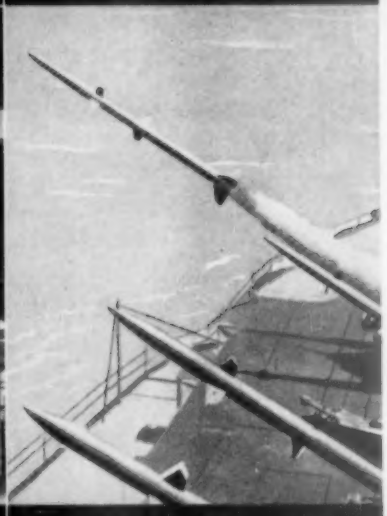


"DC" Dual Completion Trees — Safety with the Cameron closed pressure completion method.

Stainless steel jet engine stator rings, landing gear and propeller parts are forged at Cameron.



Cameron's 11,000-Ton Split Die Forging Press — largest of its type in the world today.



Cameron forged steel components are being used on many different rocket models.

FOR PRODUCTION AND PROTECTION

Cameron Christmas Trees are first of all a result of demand – demand for the finest equipment to do an important job. In meeting this demand, Cameron has become the world's largest manufacturer of Christmas Trees.

Research, design and development are a vital part of the program which has produced this result. Equally important, of course, is continuous advancement in manufacturing methods – advancement which prompted Cameron to develop a brand new forging process and build the world's largest side ram forging press (six stories tall, 11,000 ton main ram load). This process is complete with melt shop producing high quality alloy steel. While fulfilling the demand for better Christmas Trees, its use has been expanded to produce many other severe service forgings. These include critical jet engine and guided missile components.

Whatever your Christmas Tree needs – low pressure or high, single, dual or triple, for production and protection – for profits – for the best in Christmas Trees . . . call on Cameron.

Cameron

IRON WORKS, INC.

P. O. Box 1212-Houston, Texas

Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., Time & Life Bldg., New Bond Street, London W. 1 England

cost—in . . . many strategic minerals and metals.

"It is my considered opinion that over the long term, say the next 30 years, the demands of the world for oil will require that we tap more effectively the resources of countries other than the United States. This is not meant to say that we shall slack up in providing incentives for further exploration and discovery in the United States."

Fred A. Seaton, Secretary of the Interior, in a speech before the general session at the American Petroleum Institute annual meeting.

Our Engineer Shortage

"It's sobering to recognize Russia's schools are graduating more than twice as many engineers as we are. What is truly alarming, though, is the fact that we are graduating less than half the number of engineers we must have to keep our economy efficient.

"That holds at least equally true throughout the physical sciences, and most acutely so in the field of physics. We're in grave danger of having constructed a tremendously complicated machine without having made provision for personnel to keep it running and in check."

R. O. Taylor, manager of administrative division, manufacturing department of Standard Oil Co. (Ind.), in a speech before the National Management Association.

A Strange Type of Equality

"We contractors must continue to cooperate with all branches of the oil business to present a united front to combat those who would nationalize our industry and thereby strip it of the initiative that through private enterprise has enabled us to furnish approximately one-half of the total energy supply of the United States.

"With the proper cooperation between our industry and Government, we can continue to supply the energy requirements for many years to come. During the debate, passage, and after the veto of the Harris-Fulbright bill, much smear was heaped on our industry. Certain senators and others said let's have the Government take over the oil business.

"Government ownership and operation of any business or natural resource is a type of socialism that insists upon a peculiar form of equality.

"Our Constitution proclaims that all men are born equal. Those who advocate government ownership insist that all men should be kept equal. There can be no equality except equality of opportunity. We in the oil business have found and produced our products in sufficient abundance so

COLD facts about a HOT subject . . .

Stewart Stoves

● Decide right now to replace make-shift heating facilities this winter with clean, safe, dependable Stewart Stoves.

Equipped with regular Stewart Hi-Efficiency B-4 gas burners—"The Burner without an equal" — Stewart Stoves provide plenty of heat at low cost, for derrick floors, warehouses, supply stores, garages, industrial plants, etc.

They are furnished for use with either natural, butane, propane or manufactured gas —furnished with or without vents.

Natural gas steves furnished with gas valves, pilot light and pressure regulator. Butane steves do not have pilot light and pressure regulator.

CONSTRUCTION: Bodies are heavy sheet steel. Rounded top, baffle plates and legs are cast iron. Finished with high temperature aluminum paint.

TWO SIZES:

Model 15: 50,000 BTU, 35" high by 19" O.D. Wt. 100 lbs.

Model 20: 150,000 BTU, 48" high by 24" O.D. Wt. 200 lbs.

When ordering, specify gas to be used.

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

THE WEATHERFORD TECHNIQUE

Timing is vital

when running and cementing casing

Poor timing can mean a costly remedial job, loss of oil, or a possible blowout. From the moment the drill pipe is laid down until the cement sets in place behind the casing, timing is critical.

For example, mud should not be allowed to set, uncirculated, in the uncased hole too long. The longer the delay, the more pressure is required to overcome the inertia of the thickened mud column, and the greater the danger of upsetting the delicate balance between mud weight and formation pressures. Hence, the need to keep elapsed time at minimum, the need for speed when making up the cement head and prefitting the casing with properly spaced reversible scratchers and centralizers.

When running casing, too, timing is vital. It must not be run faster than the mud column can be displaced, (because of destructive hydraulic pressure surges), yet if it is run too slow, valuable rig time is wasted. Stopping casing movement can cause gelled mud, drill cuttings and sloughings to pack off against the pipe and stick it. To avoid these dangers, casing must be run in one smooth operation.

After scratcher and centralizer-equipped casing is run, it must be reciprocated long enough to remove all excess hole growth, and until gelled mud and cuttings are circulated out. In certain wells this can take up to several hours. Here again timing is vital.

The Weatherford Technique, using Weatherford equipment, is your best assurance of a well-timed casing operation and a better cement job. Call the man from Weatherford.

WEATHERFORD

WEATHERFORD OIL TOOL CO., INC.

GENERAL OFFICES: 5920 Navigation Blvd., Houston, Texas

that our people have been able to have the energy requirements to build and maintain a robust economy. We must keep it that way."

E. Dale Mount, Harry Bass Drilling Co., in a speech before the American Association of Oilwell Drilling Contractors.

Foreign Crises Old Hat

"The oil industry has been confronted at some time or another with each of the special problems peculiar to foreign investment and has found that it is possible to arrive at a satisfactory solution.

"I doubt that anything will come up in the future that we have not already faced in one form or another in the past."

Emilio G. Collado, treasurer, Standard Oil Co. (N.J.), in address before New York Society of Security Analysts.

Primrose Path to Success

"If you are interested in ultimately making the transition from being an engineer to becoming a manager or a manager-engineer, there are many steps you can take to assure and accelerate the process . . . A most important piece of advice . . . (is) . . . I think: Learn the other fellow's job."

Marvin Chandler, president, Northern Illinois Gas Co., in a speech at the Western Society of Engineers, Young Engineers' Forum.

Protection from a Squeeze-Out

"By 1975 the U.S. will need 12 to 14 million barrels of oil per day. This demand will be met by more and deeper drilling, by water flooding, by fracturing, by pressure maintenance, and by reintroduction of the lighter ends into the producing rocks and sands to force the oil to the well bore for man's use.

"Of course, all these conservation practices cost lots of money. Drilling costs are mounting, pipe and all steel products are constantly going up. The domestic oil producer who has no Middle East or other foreign oil to balance out his costs of production must have a fair return on his investment of money and time to keep him everlastingly at the job of finding more oil for the United States. Of course, the depletion tax recognition helps, and must be retained . . . at at least 27½ per cent to assure full effort to develop oil for national security.

"It seems that the domestic producer has a rather hard row to hoe at the moment. He is our first line of defense at home and must be protected against a squeeze-out by high costs compared to areas of greater productivity per well per day."

Lt. Gen. Ernest O. Thompson, Texas

Tips on Mud Valves for Toolpushers . .

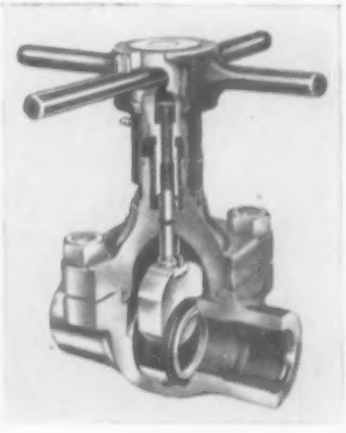
Bob Walker stops to look over a few of the MUDWONDER mud valves during rigging.

Veteran Oil Drillers Agree On MUDWONDER For Mud Valve Economy

By Robert Walker, Toolpusher, Rig #2
J. & B. Drilling Company, Eunice, Louisiana

WHEN your crew swears one mud valve is the best and the price tag is in line with other valves, logic says buy them. And, that's just what we did.

MUDWONDER cut-away view shows the double thread construction, separated stainless stem and hard chromed gate with "T" slot connection and the one-piece seat insert with the buna-N molded integrally over the steel wear rings.



Rockwell-Built MUDWONDER valves were put on all mudlines when the new "76" was rigged recently.

Past experience had proven the MUDWONDER valves as near trouble-free as a mud valve can be. So, it wasn't a difficult choice. Our vice-president, C. E. Bush, a veteran well digger, agreed that in sharply competitive contracting, J. & B. could not afford inferior valves.

The easy MUDWONDER operation, even at high pressures, and the long service life make it truly an "economy" valve. On the rare occasions when maintenance or inspections—even part replacements—are required, no drilling time need be lost. Mud valve work can be done while the crew makes a connection because the one-piece body stays in the line.

Two-inch and 4-inch MUDWONDER valves are being sent on our standpipe, mud guns, manifold, bleed-off, etc., with great success. Mr. Bush and the crew join in recommending MUDWONDER to any toolpusher having mud valve problems.

MUDWONDER valves are built in 2", 3", and 4" sizes with screwed or flanged ends for 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test).

Your favorite oil field supply store can give you complete information or write Edward Valves, Inc., East Chicago, Ind.

The Alcan test run was supervised and certified by the AAA.

Never-say-die dependability proved

NEW TASK•FORCE 57

Six new '57 Chevy trucks tamed the rugged
Alcan Highway in one round-the-clock sprint.
They covered the grueling run in less
than 45 hours (normally a 72-hour run)!

Up towering grades, through washouts, blinding dust and pounding gravel—these heavily loaded Task-Force huskies took everything the Alcan could dish out, and still they trimmed almost 30 hours off the normal running time! As a special test, two of the engines were not stopped once during the entire trip. Gas mileage ranged up to 18.17 miles per gallon! A Powermatic-equipped heavyweight went all the way in a single forward-speed range! "Despite the severity of the test under the most adverse road conditions," states the official AAA report, "not a single truck turned back or dropped out due to mechanical failure." Put an Alcan-proved Chevrolet truck to work on your job! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

on the Alcan Highway!

CHEVROLET TRUCKS

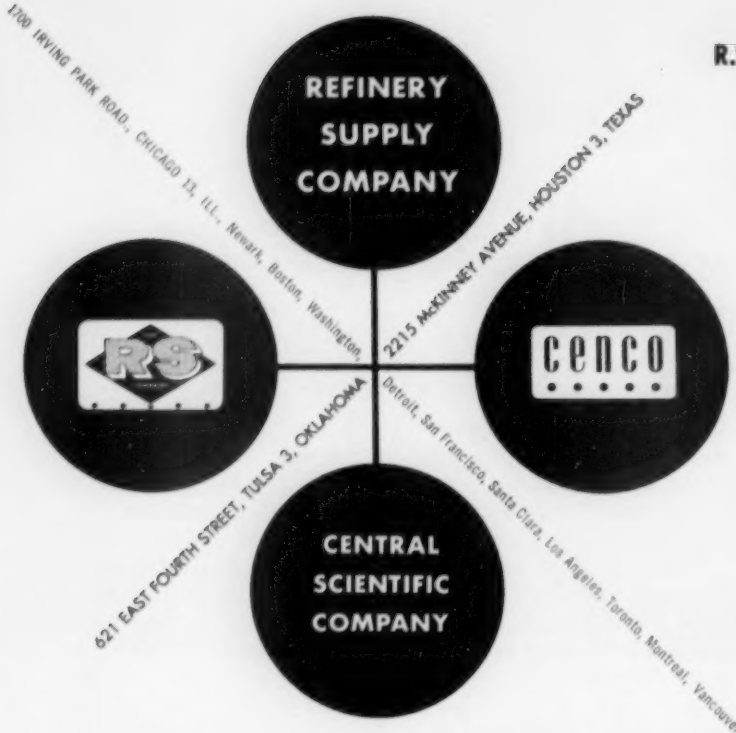
NO JOB TOO TOUGH FOR THE ALCAN CHAMPS!

Whether your job calls for fast-working efficiency against tight schedules or big muscles for off-the-road grinds—there's an Alcan-proved Chevrolet Task-Force truck ready to save you time and money!

DROP BY YOUR CHEVROLET DEALER'S SOON.

Look over his new Task-Force line for '57. You'll spot the modern features that put new Chevy trucks way out in front. You'll see right off why they're first choice with most truck buyers!

PROVED ON THE ALCAN HIGHWAY . . . CHAMPS OF EVERY WEIGHT CLASS! CHEVROLET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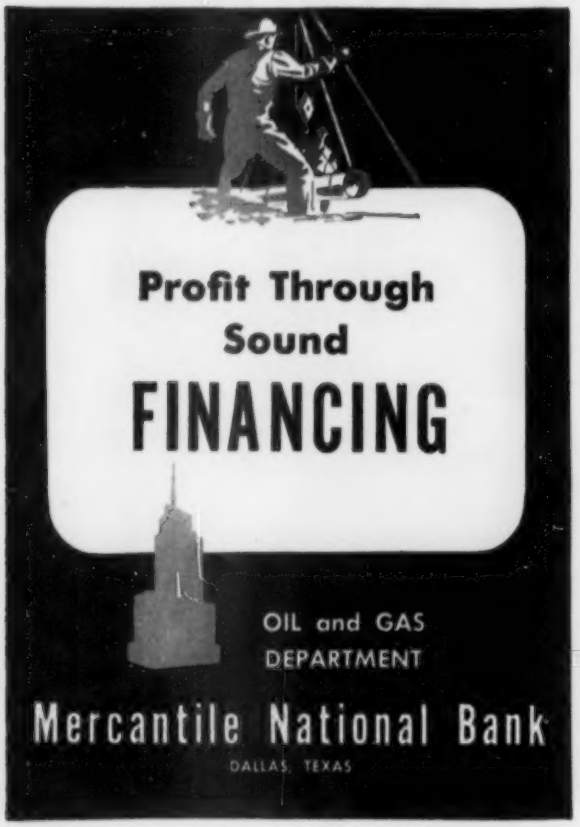
the practical and accurate method of checking

- **Line Pressures**
- **Rock pressures at wells**
- **Static pressure on orifice meters**
- **Gas pressures on pipe line leakage tests**

This instrument is based on the principle of generation of pressure by application of a known weight to a hydraulic piston on known area. Conversely, an unknown pressure can be measured by balancing its force on a piston of known area with a known weight—the result is extremely accurate pressure readings.



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the famed Top O' the Columbus—gourmet food; cocktails; supper dancing; panoramic views of ocean, bay, and city!
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Railroad Commissioner, in a paper presented at the annual meeting of the American Association of Oilwell Drilling Contractors, Fort Worth.

Oil, Allies, and Survival

"Without the oil of the Middle East the Eastern Hemisphere could certainly survive—but it would do so at a very great reduction in its standard of living. Then, Europe, as well as the Middle East, would be weakened and disaffected and be a sitting duck for Communist infiltration and gradual absorption. Direct military aggression would probably not be needed for the Soviets to take over our allies and leave us friendless in a hostile world.

"We Americans can survive without oil from the Middle East, but can we survive if our friends and allies are weakened as they inevitably would be without their basic energy supply?"

Howard W. Page, director, Standard Oil Co. (N.J.), in a speech before the Chicago Executives' Club.

One Limitation of Production

"The very future of our country is in danger if we allow ourselves to become dependent upon unreliable foreign sources for our oil supplies.

"The danger is emphasized by the present Suez situation.

"As we look to the future, in this era of supertensions, we are more concerned than ever with preserving conditions which will invite the full search for and the development of oil supplies sufficient for all our requirements.

"Only economic conditions can limit our ability to find and produce sufficient domestic supplies of oil and gas in the foreseeable future."

Robert L. Wood, Independent Petroleum Association of America in a speech before the American Association of Oilwell Drilling Contractors, Fort Worth.

Automation Is "Self-Curing"

"Wherever one has found automation in the past, one has always found an expanded industry if the automation has been successful. This is because of a rather simple, economic cycle.

"A product is produced at a lower cost . . . more people can buy the product, which gives the manufacturer an opportunity to invest still more money in modern plant methods, thereby bringing the cost of the product down even lower and again broadening the market. And so, one could call automation self-curing in the area of unemployment."

Thomas J. Watson, Jr., president, International Business Machines Corp., in a speech before the American Petroleum Institute.

CALENDAR

DECEMBER

11-12 Water Quality Control for Subsurface Injection, conference sponsored by the University of Oklahoma, Norman, Okla.

1957

JANUARY

14-16 Pipe Line Contractors Association, ninth annual convention, Boca Raton Hotel and Club, Boca Raton, Fla.

14-18 Society of Automotive Engineers, annual meeting, Sheraton-Cadillac and Statler hotels, Detroit.

17-18 Engineers Joint Council, Statler Hotel, New York.

21-25 American Institute of Electrical Engineers, 1957 winter general meeting, Hotel Statler, New York City.

23-24 Northwest Petroleum Association, Nicollet Hotel, Minneapolis.

31-Feb. 1 Annual instrument short course of Southern California Meter Association, Los Angeles Harbor Junior College, Wilmington, Calif.

FEBRUARY

8-9 American Society for Testing Materials, Symposium on composition of petroleum, Jung Hotel, New Orleans.

13-15 National Association of Corrosion Engineers, Tulsa section, eighth annual short course for pipeliners, Hotel Mayo, Tulsa.

15-16 National Society of Professional Engineers, spring meeting, Hotel Francis Marion, Charleston, S. C.

ACME OIL TOOL CO.
FISHING & RENTAL TOOL SERVICE THROUGHOUT THE SOUTHWEST
Acme's service men have a thorough knowledge of Mid-Continent Drilling and Production problems and methods. Acme manufactures fishing tools, rents 'em, and maintains general oil field machine shops. For a job well done . . . right now . . . call ACME!
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Contact ACME or your coring or testing co. for S. R. BOWEN ROTARY JARS
Service when you need it!
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When you invest

...Specify National Seamless Oil Country Tubular Products. In oil fields throughout the world, you'll find USS NATIONAL Seamless Drill Pipe, Casing and Tubing constantly on the job, safeguarding production. Rough and ready to be worked hard, and ready to meet the higher stresses of drilling deeper holes tomorrow.

These NATIONAL Seamless Oil Country Tubular Products are known the world over for their outstanding service record in deep-well work. The secret of their strength and dependability may be attributed to two things—quality steel and a unique method of manufacture. Each seamless tube is pierced from a solid billet of steel. And only steel of the very best forging properties and of the highest uniformity can be used, since the piercing operation tends to search out any defects in the metal.

Thus, NATIONAL Seamless Oil Country Tubular Products are built to take the worst that oil well drilling has to offer—*built to give you more service and better service for every dollar you invest.* Remember *that*, the next time you order drill pipe, casing, or tubing.

SOME SIGNIFICANT DEVELOPMENTS BY NATIONAL TUBE...

NATIONAL DEOXIDIZED BESSEMER STEEL CASING AND TUBING—GRADES H-40, J-55—Especially well-suited for oil production because of its combination of high yield strength and good ductility.

NATIONAL WARM-WORKED CASING—GRADE N-80—An extremely high-strength casing possessing a uniformity of physical properties which gives it high collapse resistance and greatly increased joint strength. Hydrostatically tested to 80% minimum yield strength up to a maximum of 10,000 psi.

NATIONAL DEEP-WELL CASING—A stronger casing than is provided under A.P.I. specifications, to meet constantly increasing depths. Due to the severe service for which it is intended, it is hydrostatically tested to 80% of minimum yield strength up to a maximum of 12,000 psi.

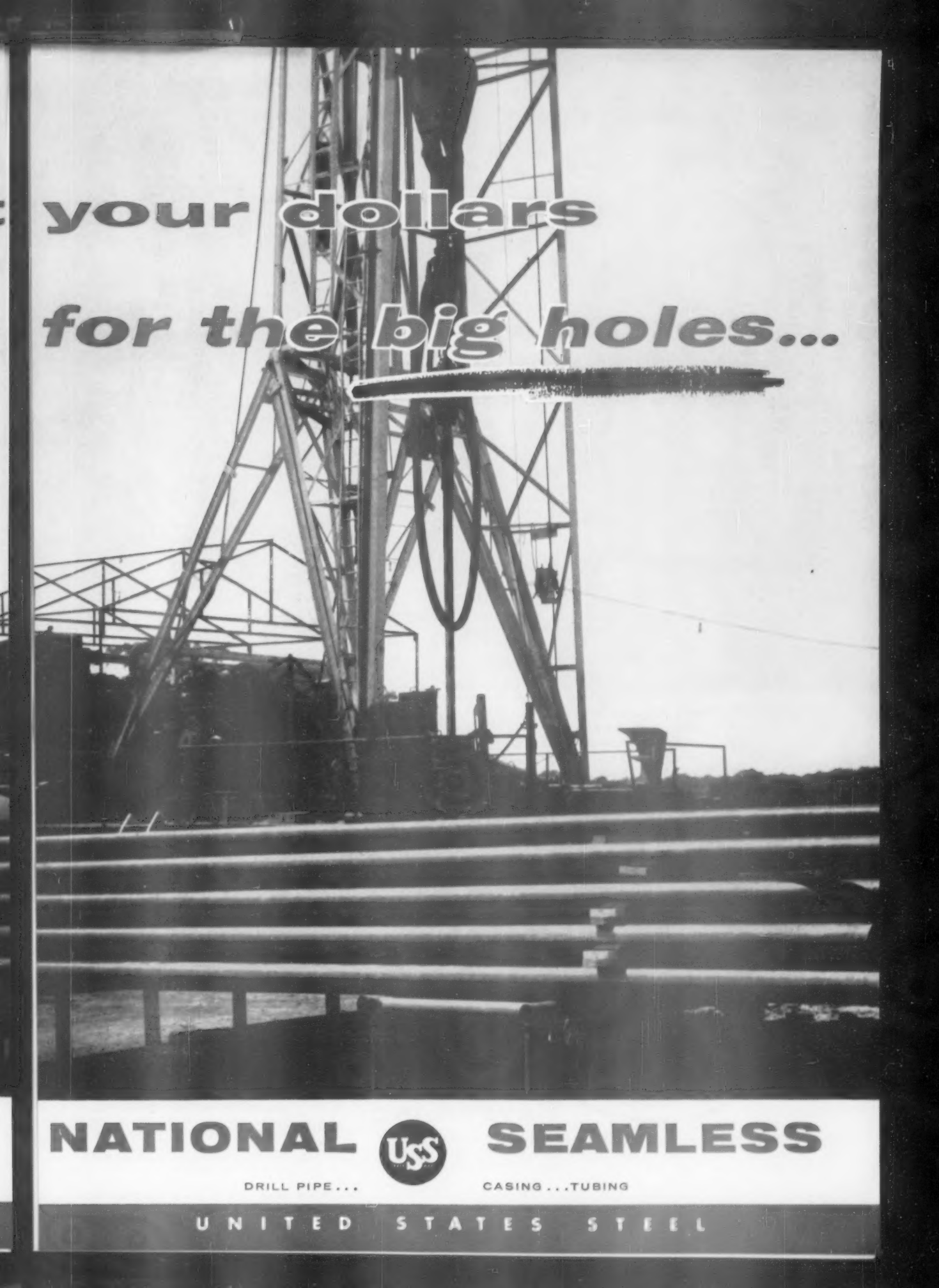
NATIONAL (B) BUTTRESS-THREAD—Developed to satisfy the need for a casing joint which will safely and economically support the weight of deep-well casing. The buttress-thread joint is comparable in strength to that of the body of the pipe.

For further information, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa. Ask for Bulletin No. 15.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

SEE The United States Steel Hour. Televised alternate weeks. Consult your local newspaper for time and station.

UNITED STATES STEEL

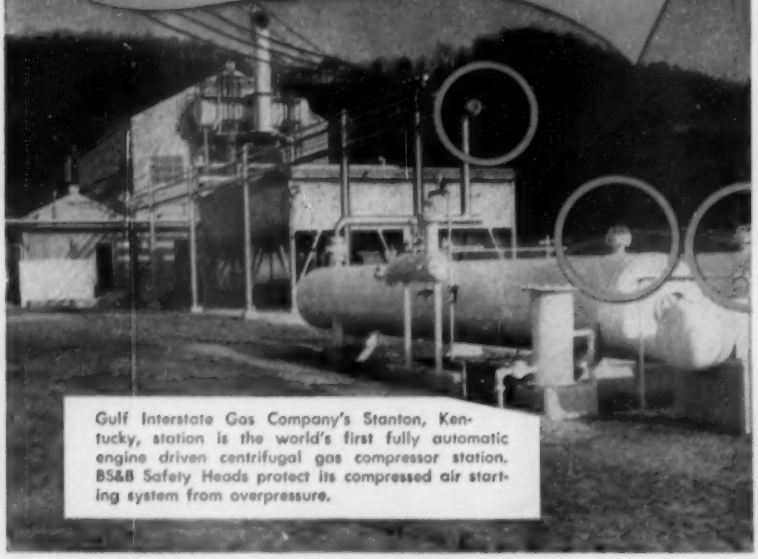


NATIONAL USS **SEAMLESS**

DRILL PIPE . . . CASING . . . TUBING

UNITED STATES STEEL

Another Industrial First For BS&B *Safety Heads*



Gulf Interstate Gas Company's Stanton, Kentucky, station is the world's first fully automatic engine driven centrifugal gas compressor station. BS&B Safety Heads protect its compressed air starting system from overpressure.

At Stanton, Kentucky, is a remarkable gas pipeline compressor station which is operated entirely by *remote* control from Gulf Interstate Gas Company's Clementsville, Kentucky, station some 80 miles away!

When the starting button is pushed at Clementsville, instruments at Stanton automatically start the four-cycle 3500 hp reciprocating engine by compressed air supplied from large compressed air storage tanks.

These tanks are fully protected against the dangers of overpressure by BS&B Safety Heads which will provide *instantaneous* and automatic pressure relief through a full pipe-sized opening should overpressure develop!

BS&B Safety Heads are protecting millions of dollars worth of equipment in hundreds of installations throughout the oil and gas industry —as well as in other industries throughout the world. For more information on how BS&B Safety Heads can be put to work for you, contact your nearest BS&B Representative—or write to . . .

THE "CIRCUIT BREAKER" of Pressured Systems

BS&B — ANOTHER EXAMPLE OF PRODUCT LEADERSHIP

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22 Natural Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.
23-25 Instrumentation for the Process Industries, sponsored by Texas A. & M. College, chemical engineering department, College Station, Tex.
24-28 American Institute of Mining, Metallurgical and Petroleum Engineers, annual meeting, Hotels Roosevelt and Jung, New Orleans.

MARCH

3-6 American Institute of Chemical Engineers, regional meeting, the Greenbrier, White Sulphur Springs, W. Va.
6-8 American Petroleum Institute, Southwestern district production division meeting, Statler-Hilton Hotel, Dallas.
8 Ohio Oil and Gas Association, winter meeting, Deshler-Hilton Hotel, Columbus, Ohio.
11-15 American Institute of Chemical Engineers, regional meeting, Philadelphia.
11-15 National Association of Corrosion Engineers, Kiel Auditorium, St. Louis.
12-13 Subsurface Geology Symposium, fifth annual conference, sponsored by the University of Oklahoma, Norman, Okla.
20-22 American Petroleum Institute, southern district production division meeting, Washington-Youree and Captain Shreve Hotels, Shreveport, La.
25-27 Western Petroleum Refiners Association, annual meeting, Hilton Plaza Hotel, San Antonio, Tex.
27-29 American Power Conference, Sherman Hotel, Chicago.

APRIL

1-4 American Association of Petroleum Geologists, national convention, Kiel Auditorium, St. Louis.
2-4 Corrosion Control, fourth annual conference, sponsored by National Association of Corrosion Engineers and the University of Oklahoma College of Engineering, University of Oklahoma, Norman, Okla.
7-10 Petroleum Equipment Suppliers Association, annual convention, Palm Springs, Calif.
7-12 American Chemical Society, national meeting, Miami, Fla.
10-12 American Petroleum Institute, Mid-Continent district production division meeting, Mayo Hotel, Tulsa.
11-13 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest Regional Conference, Portland, Ore.
14-17 Texas Independent Producers and Royalty Owners Association, Galves and Buccaneer Hotel, Galveston, Tex.
16-18 Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, Okla.
16-18 National Petroleum Association, fifty-fourth semiannual meeting, Cleveland.
24-26 National Gasoline Association of America, thirty-sixth annual convention, Rice Hotel, Houston.
24-26 American Petroleum Institute, Rocky Mountain district production division meeting, Gladstone, Townsend, and Henning Hotels, Casper, Wyo.
28-30 Independent Petroleum Association of America, midyear meeting, Buena Vista Hotel, Biloxi, Miss.
29-30 Automatic Control in the Petroleum and Chemical Industries, conference sponsored by the University of Oklahoma, extension study center, University of Oklahoma, Norman, Okla.

29-May

1 Southern Gas Association, annual convention, New Orleans.

NATURAL GAS PIPELINE COMPANY OF AMERICA'S QUINDUNO STATION—equipped with five Beaird-Ingersoll-Rand 12SVG 660 h.p. packaged compressors. Young radiators with lubricating oil coolers, gas interstage and after coolers and all necessary controls. Other sizes 110 to 660 h.p.

Packaged Compressors Handle —

CRITICAL SOUR GAS PRODUCTION PROBLEM

3300 packaged compressor horsepower is used in the Natural Gas Pipeline Company of America's Quinduno Field station to boost sour casinghead gas through a desulphurization plant and into transmission lines. Providing this horsepower are five Beaird-Ingersoll-Rand 12SVG 660-h.p. units. Gas engineered for the job, the units are equipped with stainless steel compressor piston rods and special rings. Engine radiators which contain gas interstage and aftercooling sections, have been constructed with admiralty metal tubes and aluminum fins. All compressor fittings and scrubber elements have been built from non-corrosive materials.

Capable of handling up to 25 mmcfd, the units pick up at 19 psig and use two stages to boost the gas to transmission line pressure of 260 psig.

Packaged compressors were selected by Natural Gas Pipeline because of the savings that could be achieved in installation time and labor. Also should the gas volume drop off, one or more plants could be moved as complete units to other service. The remaining units would then economically continue production throughout the life of the field. Each of the units when finally taken out of this service, and moved to another, will be almost wholly salvaged.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your special operating requirements.

BEAIRD MACHINING MANUFACTURING STEEL WAREHOUSE

THE J. B. BEAIRD COMPANY, INC.

PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

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LP-GAS SYSTEMS

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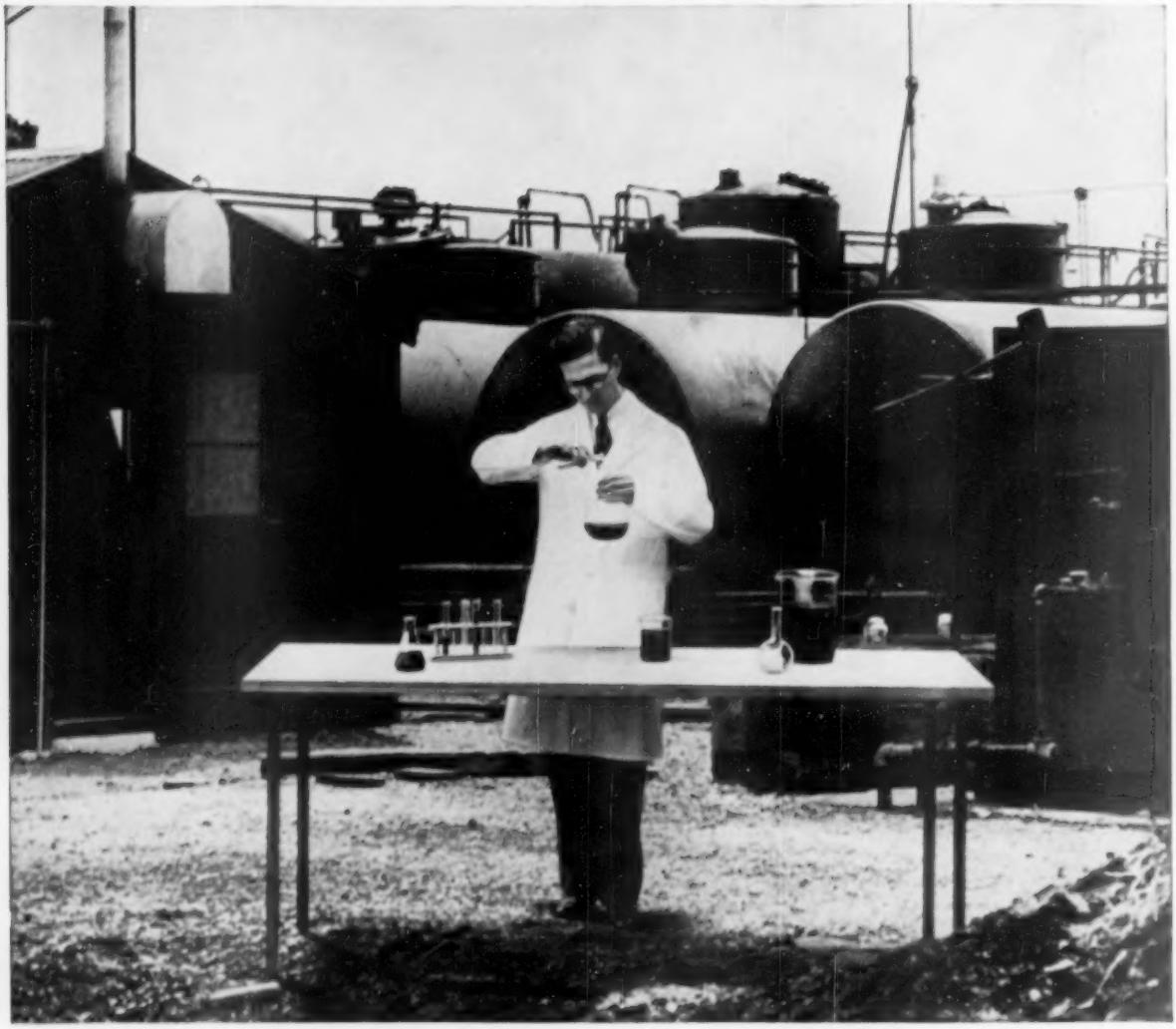

What's a chemist got to do with tank cars?

Liquid level—vapor action—types of linings—temperature factors—the presence of impurities . . . these are a few of the considerations which the chemist must evaluate. It's the chemist's job to see that bulk liquids are shipped in the cars equipped to carry his products. The knowledge gained from years of hauling liquids in bulk enables General American to meet the chemist's exacting requirements—to assure that corrosion of the cars will be minimized and product contamination prevented.

This skill and experience is part of every GATX lease . . . a lease that provides shippers with the most dependable service available for bulk liquid transportation. When you lease cars from General American, you avoid the need for capital investment as well as operating, servicing and maintenance problems.

If you'd like additional information concerning the advantages of a GATX lease, call or write your nearby General American District Office.

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING . . .

Trader Whit

VERY few of our readers ever heard of C. H. Whitman, but last week about a hundred oil men traveled from over half the continent to Shreveport, La., just to attend his retirement party. That's because he was a big name in a small but highly important segment of the oil industry—crude-oil trading.

For some 20 years Whit was manager of the crude-supply department of Esso Standard Oil Co., buying crude for the big Baton Rouge refinery. That would sound like a pretty soft job, what with hundreds of producers all around just busting for a chance to sell more oil. But it's not simple. Keeping a refinery supplied with just enough but not too much of the right kind of crude is like walking a tightrope while balancing a martini on your nose and juggling a dozen Indian clubs.

Whit was an expert at this tricky act; in fact, he was just about the granddaddy of the profession. There are only a couple of hundred crude-oil traders in the country, but they've all had dealings with Whit, and every one of them who could get away from his phone took time out to go to his party. Crude-oil men, you see, form a sort of inner lodge within the oil fraternity, because they do business with each other no matter where they are located.

Here's a sample transaction, one that Whit himself told us about not long ago: He arranged to buy some crude he didn't particularly need, being produced in the Southwest for a rival company with a refinery on the Great Lakes (and which didn't particularly need it either), on condition that that company would buy the equivalent amount of crude from an independent producer in Montana.

Now neither Whit nor his company had the slightest interest in Montana production or Great Lakes refining. But that Montana independent also has production within reach of the Baton Rouge refinery. So Whit figured it would be good business, in the long run, to make a friend out of him by helping him find a market for his Montana crude.

That incident illustrates several things about the little-known business of buying and selling crude oil. It shows how crude traders thousands of miles apart do business with each other continually, how they do favors for each other and for unaffiliated producers and refiners, and how crude oil finds a market one way or another.

But to get back to Whit's party. These several score of crude-oil men came to say goodbye to Whit, but they had other fish to fry, too. With the Suez Canal closed, every one of them was scrambling around for opportunities either to buy or sell some crude oil. And here in one room were practically all the people in the country in position to do either.

It's a good thing that a lot of Whit's Shreveport friends were there to talk with him, because his out-of-town guests were wheeling and dealing like crazy. We'll lay a small bet that several million barrels of crude oil changed hands that evening. And if you could have made a tape recording of all the private conversations you would have learned more about the oil supply, demand, and transportation situation of the entire world than you could uncover in a month of research.

A crude-oil man's stock in trade is an intimate knowledge of where crude is available, who could use it, and how to get it moved at the lowest cost. That's why he's either in an airplane or on the telephone most of the time. And that's why today he's the unseen kingpin in the complicated operation of rearranging crude sources and transportation routings to supply refineries in Europe and on our own Atlantic Coast with crude they can no longer get from the Middle East.

Whit wasn't at all insulted by the fact that his guests turned his party into a trading pit. If he hadn't been scheduled to take up fishing as a full-time occupation, he'd have been right in the middle of the dealing himself. And he knew that the younger men he'd helped to initiate into the traders' lodge over the years would be able to do the job in such fashion that the industry wouldn't suffer one whit even though it was losing its one and only Whit.

—Henry D. Ralph.

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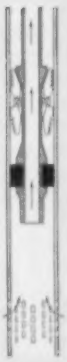
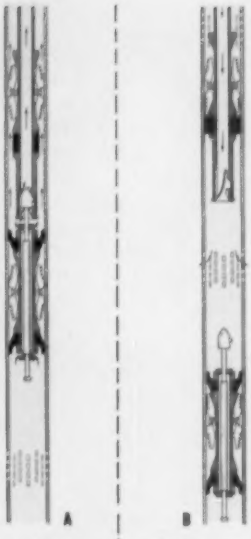
SWAB AND TEST

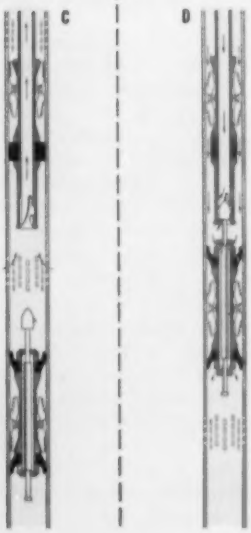


or use it with a **BAKER RETRIEVABLE BRIDGE PLUG** for as many straddle operations as required... in **ONE ROUND TRIP!**



A — Run tools in together

B — Release Plug, straddle interval, fracture or acidize



C — Swab and Test

D — Pick up plug, move to next interval

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There's a double payoff in this oil emergency

HOW can the United States supply Europe with half a million barrels of oil a day, or more, without any pinch in its own supplies?

Probably few people outside the oil industry give that question a passing thought. But one New York City newspaper was curious, and came up with the right answer.

It said editorially that our reserve producing capacity is due to the enlightened self-interest of a free industry, to the conservation policies of the oil-producing states, and to the percentage depletion provision of the tax laws. It called these things the bulwark of our national defense.

THAT IS SO RIGHT. That is exactly what the industry has been saying all these years. But it hasn't impressed enough people in the proper places.

In spite of the industry's achievement record, there are people in high places who are continually trying to take away its freedom of action, who question that its self-interest can ever be enlightened or for the good of the nation.

The present emergency is being met because of the industry's past and present freedom to move rapidly, improvise, change direction, and use its on-the-spot business judgment. Yet there are perennial state and federal proposals to put the industry into various strait jackets, to have some government agency plan for it and direct it.

The state-operated conservation program, implemented by the Interstate Oil Compact Commission, has encouraged the development and holding of crude reserves. Yet for several years, and particularly during recent months, it has been sniped at and villified as a scheme to make oil scarce and costly.

Percentage depletion is under constant attack as a tax gimmick, a loophole, a maker of millionaires. Its critics have refused to listen to proof that it is primarily responsible for the enormously expensive exploration work that has built our reserve oil resources.

So it is gratifying, as well as a little surprising, to see the truth of the industry's position recognized at last by a metropolitan newspaper which has not been noted for pro-industry leanings.

BUT DON'T LET IT STOP THERE. This is a golden opportunity to broadcast the proof that these policies have been sound and beneficial. The public is closely watching the industry's emergency performance. So now is the time to explain what makes it possible.

The payoff of our wise national oil policies is the reserve producing capacity they have created for emergencies. There can be another payoff in creating a reserve of public understanding of these policies.

Inco high-temperature research note:

Oxidation

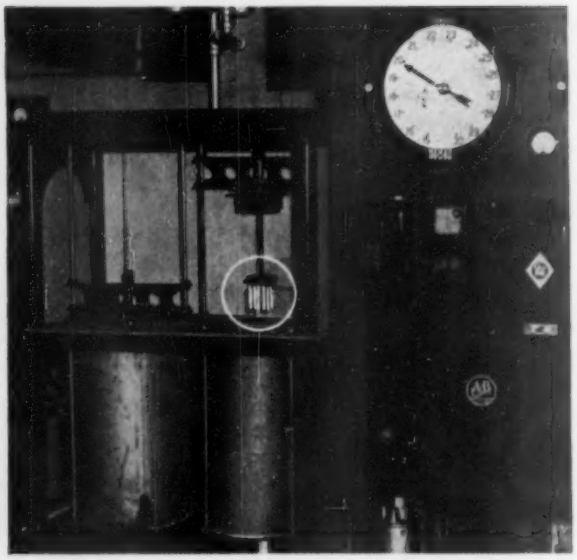
...and its effect on metals at high temperature

High-temperature corrosion is one of the basic processes by which metals fail, and oxidation is truly a process of high-temperature corrosion.

The formation of an oxide film is accompanied by a change in volume that puts the film under compressive stress. Subsequently, when the underlying metal cools, it contracts, further aggravating the stress situation. Eventually, under repetitive heating and cooling cycles the normally protective oxide may rupture from the metal surface.

Obviously, such ruptures result in progressive loss of useful load-carrying metal by oxidation.

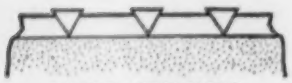
Resistance to oxidation, therefore, is notably affected by the behavior of the oxide scale. It may be a tightly adherent protective scale, or it may break down in one of the ways shown in the sketches, and thus accelerate oxidation.



Machine especially designed by INCO engineers for determining the effect of cyclic heating and cooling on sheet metals while exposed to oxidizing conditions. Through work with this and other types of equipment, Inco High-Temperature engineers investigate actual cause of damage and how metals fail at high temperatures. Thus, their research can establish the materials most suitable for specific applications.

Oxide Scale Breakdown by:

BLISTERING



SHEAR CRACKING

FLAKING OR SPALLING

Blistering may occur in oxide layers having good elasticity but poor adherence to the metal surface.

Shear cracking on the other hand will be found in oxides that are adherent but relatively brittle.

Flaking or spalling results when the oxide is both brittle and non-adherent.

When scale peels away, fresh areas of metal are exposed to attack. Accordingly, the economy of alloys that provide tight, adherent scale is self-evident.

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Current and significant in . . .

The Industry This Week

Industry

• **The trickle of American oil to Europe is fast becoming a flood.** Before Government even gave the go-ahead, U. S. firms shipped nearly 12 million barrels from the Gulf Coast in the emergency. Peak will come in December and January. P. 80.

The world tanker fleet will undergo a 50 per cent expansion in the next 5 years. Cost will be $1.5 billion each year. Result will be one-third of world's merchant fleet devoted entirely to oil. P. 88.

Imports-control question is on the shelf for duration of the current crisis. But ODM says imports impaired national security before Suez closing and warned importers against ever returning to high ratios. P. 95.

Pipelines

• **A major crude line to provide a Gulf Coast outlet** for 200,000 bbl. daily or more of West Texas crude is in the planning stage. Some 10 companies are discussing the project which would extend from Midland southeast to Beaumont. P. 83.

Trans-Canada pipeline has inched across its first river in a race against paralyzing winter weather in the prairie provinces. P. 98. . . . Meanwhile, Canadian officials have given the company another delay in nailing down financing of the line. P. 91.

A 2-year battle for a big-inch gas line into North Central Texas has been won by Natural Gas Pipeline Co. of America. FPC finally approved plan for 20 and 26-in. line from Texas Panhandle through southern Oklahoma into Texas. P. 90.

Exploration

• **Cuba's first deep test** in Las Villas Province has been started by Consolidated Cuban Petroleum Corp. Firm also has other drilling ventures in the books. P. 106.

Peru is opening new offshore areas to private oil companies, and Chile is considering liberalizing its state oil monopoly. P. 106.

Drilling

• **The turbodrill now has fired Russian enthusiasm** for multibore, directional drilling. Key to cluster drilling is the simple way a turbodrill sinks a slant hole. P. 105.

Israel has intensified development drilling in Heletz field. Goal is production of 2,800 bbl. daily by February to replace oil cut off by Russia because of Egyptian hostilities. P. 106.

Processing

• **Sun Oil is making the all-out plunge** for its five grades of custom-blended gasoline. The revolutionary marketing technique will now be extended to its stations in 19 states in the East and Midwest since Florida tests proved popular with customers. P. 84.

Cities Service is planning a big move in Canada. Its $30-million expansion program calls for a $22-million Toronto refinery, new marketing facilities, and stepped-up production. P. 95.

El Dorado Refining Co. has been sold to Petro-Atlas Corp. Involved are 1,700 bbl. daily oil production, 4½ million barrels of reserves, and an 18,000-bbl. daily refinery. P. 86.

"Extra" Crude Moved from Gulf in November

Company	Exports	East Coast	Total
Humble	4,140,000	325,000	4,465,000
Texas Co.	1,100,000	375,000	1,475,000
Gulf	550,000	900,000	1,450,000
Magnolia	1,084,500	81,000	1,165,500
Shell	850,000		850,000
Sinclair	475,000	150,000	625,000
Eastern States	425,000		425,000
Esso		400,000	400,000
California Co.		360,000	360,000
Atlantic		330,000	330,000
Crown Central	250,000		250,000
Total	8,874,500	2,921,000	11,795,500

Oil subdues another crisis as . . .

. . . Trickle to Europe Becomes a Flood

THE U. S. oil industry was showing the world last week just what it can do in an emergency.

By the time the Government gave the go-ahead to an industry plan to meet such a crisis, the industry itself already was moving nearly 600,000 bbl. daily of extra oil to East Coast and European refineries. The gigantic movement actually has been under way since mid-November.

Tankers have lifted 11,795,500 bbl. of emergency oil from gulf ports since November 10. Of this 8,874,500 bbl. went to Europe and 2,921,000 to the East Coast. It will replace oil lost to both regions by the Middle East blockade.

This amounts to a 393,183-bbl. daily average for the month. The flow actually was much greater—nearer 590,000 bbl. daily—since bulk of the movement covered only 20 days.

The flow of crude probably will hit a peak in December and January with the Government in the saddle now as supervisor of the shipments.

Busy ports . . . Nearly 40 per cent of the foreign-bound crude leaving this country is going through the port of Houston.

Most of the remainder is leaving from Corpus Christi and Port Arthur, Tex., and Louisiana terminals on the Mississippi River.

Records show that 3,213,241 bbl. of crude and 1,301,834 bbl. of petroleum products were exported from Houston from November 10 to November 30. These totals do not include shipments to East Coast refineries to replace Middle East crude. During the same period last year, not a barrel of oil left Houston for export, and products exports totaled about a million barrels.

A tipoff on December shipping trends may be gleaned from Magnolia plans. The company will more than double its November shipments, scheduling 3,000,000 bbl. for the month. Of this amount 1,750,000 bbl. will go to Europe and 1,250,000 bbl. to the East Coast.

The outlook . . . This outpouring of oil took place without government urging. It was under way before officials called the Middle East Emergency Committee into action to coordinate the movement.

One high government official reported last week there will be no problem in stepping up domestic production by 800,000 to 850,000 bbl. daily or in moving 500,000 bbl. daily and possibly more to tidewater.

Some industry transportation men fear pipeline capacity and shortage of barges and tankers may prove a bottleneck, however, and make the 500,000-bbl. daily average hard to maintain. They point out all the current shipments have come from storage and do not reflect any increased production.

Extent of demand . . . The Bureau of Mines forecasts an increased demand for 690,000 bbl. daily of domestic crude for December.

Texas is expected to be called upon for 400,000 bbl. daily of this increase and Louisiana 200,000 bbl. The Government, however, does not plan to exert any pressure on the producing states to increase their output to pro-

vide oil for Europe. It will depend on the influence of the bureau's forecasts, which generally are followed closely by the states.

The bureau's forecast was accompanied by this observation: "The large increase indicated in the demand for domestic crude oil for December is a preliminary estimate of what can be done by increased production and withdrawals from stocks to replace imports of Middle East oil and to provide U. S. oil for Western Europe."

In addition to higher demand in Texas and Louisiana, the bureau saw increases in requirements for oil from 10 other states. For most of these, however, the higher rate will be needed to meet domestic refinery demand.

Increases forecast included: New Mexico, 25,000 bbl. daily; Oklahoma, 20,000; Kansas, 13,000; North Dakota, 7,000; Wyoming, 6,000; Mississippi and Montana, 4,000 each; Utah, 3,000; Arkansas, 2,000; and Michigan, 1,000. Increase for all other states combined was placed at 5,000 bbl. daily.

Total December crude demand was estimated at 7,725,000 bbl. daily compared with 7,035,000 bbl. forecast for November.

Rush to coast . . . The industry in inland areas, meanwhile, is straining every sinew to use all available pipeline capacity and barges to move fresh crude to tidewater.

Crude exchanges by pipelines are reported in many areas.

Service Pipe Line Co. last week stepped up deliveries from West Central Texas to the Gulf Coast by 17,000 bbl. per day. Two new booster stations were installed, one between Graford and Mexia and the other between Mexia and Hufsmith. Manifold connections were changed at Bowie to reverse the flow and pump the extra crude south. This deficiency going north to Drumright then was made up by increasing throughput from New Mexico and West Texas on another leg of the line.

Of the 17,000-bbl. throughput increase, 7,000 bbl. daily is being tendered to Humble Pipe Line Co. at Mexia and the other 10,000 bbl. is pumped to the Gulf Coast through Service and affiliated facilities.

Humble's 18-in. line starting at Kemper station in West Texas is now operating at capacity for the first time. To do this Humble picked up crude from Pasotex and Shell. The Humble line to Corpus Christi area also is delivering more crude through exchanges.

Some pipelines are being stepped up with portable booster stations. They usually are diesel-powered units which can be installed in a few days.

Gulf has reversed its dual 10-in. system from Lufkin into Oklahoma and soon will be able to deliver 30,000 bbl. daily of Oklahoma crude from storage. Arrangements have been made to move the crude from Lufkin to the coast.

West Texas Gulf Pipe Line Co., which operates one of the major crude lines from West Texas to the Gulf Coast, is rushing to completion an expansion program. It will provide an outlet for an additional 59,000 bbl. of crude daily. The pipeline is controlled by Gulf Oil.

New pump facilities at three stations are due to be in operation by the end of this year. West Texas Gulf's system is 26-in. from Colorado City to Wortham, Tex. There it splits into a 24-in. line to the Gulf Coast near Beaumont and a 20-in. line to Longview in East Texas.

In the West . . . Pipeline movements from the Rockies to the Mississippi River will be stepped up soon.

Carter Oil Co. started buying an additional 5,000 bbl. daily of Elk Basin crude in Wyoming this month. It will

Here's the Emergency Plan:

THE federal Government has taken a supervisor's role in speeding U. S. oil shipments to Europe. Its agent is the Middle East Emergency Committee.

The M.E.E.C. is composed of American oil companies engaged in foreign operations. Present members are American Independent Oil Co., Arabian American Oil Co., Caltex Oil Products Co., Cities Service Co., Creole Petroleum Corp., Getty Oil Co., Gulf Oil Corp., Sinclair Oil Corp., Socony Mobil Oil Co., Standard Oil Co. of California, Standard Oil Co. (N.J.), Standard-Vacuum Oil Co., The Texas Co., Tidewater Oil Co., and Venezuelan Petroleum Co.

What It Can Do

All scheduling of domestic and Atlantic shipping will be done by the committee, based on cooperative action by the participating companies.

This involves the most efficient use, without regard to ownership, of terminal and storage facilities, tankers, pipeline capacity, and other transportation facilities. The goal is to minimize duplications, multiple loadings and discharging, split cargoes, long hauling, cross and back hauling, and idle time in port. Other areas of action include:

. . . Purchase, loan, sale or exchange of crude, products or blending agents for distribution in foreign countries.

. . . Changing producing or refining rates in foreign areas to reduce transportation difficulties.

How It Will Work

The U. S. Government keeps complete control over the operation. All M.E.E.C. actions will be reviewed by Interior, Defense, and State Department officials and representatives of the Office of Defense Mobilization.

Interior Secretary Fred A. Seaton is administrator of the plan. Assistant Secretary Felix Wormser is second in command. J. Ed Warren, vice president of the National City Bank of New York and formerly deputy petroleum administrator during the Korean War, will serve as consultant to the Government.

The Government will issue no orders itself and will make no financial contributions. It's a voluntary agreement in the broadest sense with the oil industry carrying the load.

The 15 companies will stand any expense involved in revamping tanker routes or pipeline systems or using alternate and more costly transportation. The Government will merely see that nothing is done in violation of antitrust laws beyond exceptions specifically approved by Atty. Gen. Herbert Brownell.

Provision will be made to deal with complaints that independent interests are being hurt by any action. Seaton is expected to name a man familiar with independent operations to act as his consultant.

Tanker pools will not extend to diverting to foreign service the ships needed to supply the U. S. East Coast. If a tanker crisis arises, however, vessels under friendly foreign flags may be put into East Coast service. This will require waiving a law prohibiting foreign vessels from engaging in coastwise trade.

Ample provisions exist in the Defense Production Act for the President to make the relief program official. The Government then could assume the cost and responsibility for the program. But Washington officials say there is no intention to take such drastic action or even resort to compulsion to get the program through.

PRECIOUS CARGO of oil for Paris is being hauled by this tanker shown sailing up the historic Seine River. The scarce fuel is being rationed in France where refiners have cut back operations because of shortages due to Suez blockade. Some relief is in sight with arrival of first ships last week with crude from Texas.

LONDON MOTORISTS line up at gas station where they feel the pinch of Middle East oil shortage. Government has reduced amount of gas authorized for private use, and service station owners are limiting sales to "regular customers."

be tendered to Platte pipeline, moved to the river, then barged to the gulf.

One company survey estimates there is additional capacity of 450,000 bbl. daily in the region embracing the Mid-Continent, Rockies and Illinois basin. But pipelines will have to be beefed up to handle the flow. This will include larger gathering systems, additional pumping capacity.

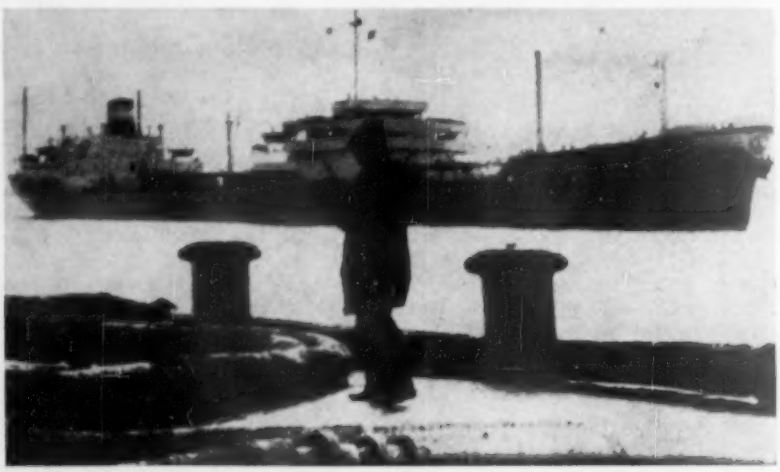
But the crude may strike another snag at the Mississippi—shortage of barges. The barge capacity down the Mississippi is placed at 25,000 bbl. daily. Of this 13,000 bbl. already is committed. It includes 3,000 bbl. from Kansas, 5,000 bbl. from Oklahoma, and 5,000 from the Rockies.

In California . . . Oil from Alberta is being pushed over the Trans Mountain pipeline to the Puget Sound area for shipment to California refineries. The additional oil will replace Venezuelan and Middle East crude supplies used there.

Trans Mountain facilities will be pushed to capacity of 180,000 bbl. daily during December. This month's demands of California refiners will exceed averages of previous months by 36,000 bbl. daily.

This movement is expected to expand. Trans Mountain has already installed additional temporary pumping stations along its line and plans others. These will boost capacity to 200,000 bbl. daily.

Alberta officials say crude production in the province could be boosted quickly from present 400,000 bbl. daily to 700,000 if transportation facilities were available to move the oil. Both Trans Mountain and Interprovincial lines are reported operating at near capacity now.



FIRST LONG HAUL is over for the tanker Athinia Livianos, shown riding at anchor in the Thames Estuary near London after voyage around the Cape of Good Hope. Ship carried 28,000 tons of crude on the 30-day, 12,000-mile trip.

Crude prices inch up . . . The stiffened demand for crude has been accompanied by price increases in several regions, including:

. . . Corpus Christi area of Texas Gulf Coast. Southern Minerals Corp. posted a 15-cent per barrel across-the-board hike. It sent select crude of 40°-gravity to $3.35 a bbl. The hike affects about 45,000 bbl. per day bought in seven South Texas counties.

Southern Minerals President Maston Nixon said he anticipates a general price increase. He emphasized that the advance posted only partially covers increased costs to the producers since the last general oil price advance.

. . . Rockies. Continental Oil Co. increased price from 1 cent per barrel for 35°-gravity crude to 40 cents for 15°-gravity. The hike affects sour crude purchased in Wyoming and Montana in the Bonanza, Circle Ridge, Elk Basin, Sussex, and West Sussex fields.

Ohio Oil Co. increased prices 10 cents a barrel for Wyoming black crude at Byron, Garland, Oregon Basin, and Hamilton Dome fields and 20 cents a barrel at Hidden Dome.

. . . New Mexico. Shell Oil Co. also raised posted prices 7 cents per barrel for Ordovician crude in Lea County. The oil is comparable to Ellenburger crude in West Texas. The increase raises the price to $2.90 per barrel and covers 7,500 to 8,500 bbl. daily.

Prices also rose at isolated spots

abroad. Both Esso Export Corp. and Mid-East Crude Sales Co. (Caltex) increased prices of Middle Eastern crudes at eastern Mediterranean ports by 23 cents a barrel. In Venezuela, Richmond Exploration Co. (Standard of California) increased the price of heavy 10° Boscan crude to $1.72 at its deep-water loading terminal at Bajo Grande.

Oil trickles in . . . The first tankers hauling cargoes around the Cape of Good Hope for oil-hungry Europe also began arriving at Continental ports last week.

The first to arrive was Atlantic Oil Carriers' Athinia Livianos. It docked at British Petroleum Co.'s Kent refinery on the Isle of Grain with 200,000 bbl. of Kuwait crude. The ship took a month to the day for the trip—a week longer than through Suez — and the extra hauling cost was 80 cents per barrel.

Closely following the Athinia Livianos were a number of other tankers carrying oil from the Persian Gulf and from the U. S. Gulf Coast to British refineries. Later in the week France received its first shipments—four tankers with 550,000 bbl. of Texas crude.

The supplies will be far less than sufficient to keep the refineries operating at capacity. Most European processors already have cut back to at least 75 per cent of capacity.

Distribution of the available oil will be controlled by the Petroleum Industry Emergency Group set up by the Organization for European Economic Cooperation in Paris. The group will allocate shipments so that a fair division of available supply will result.

Life of the emergency group depends on length of time it takes to reopen the Suez Canal. The problem of how, by whom, and when the canal is to be cleared is still undetermined. It may take some diplomacy to work this out because the recent combatants have different ideas on what should be done.

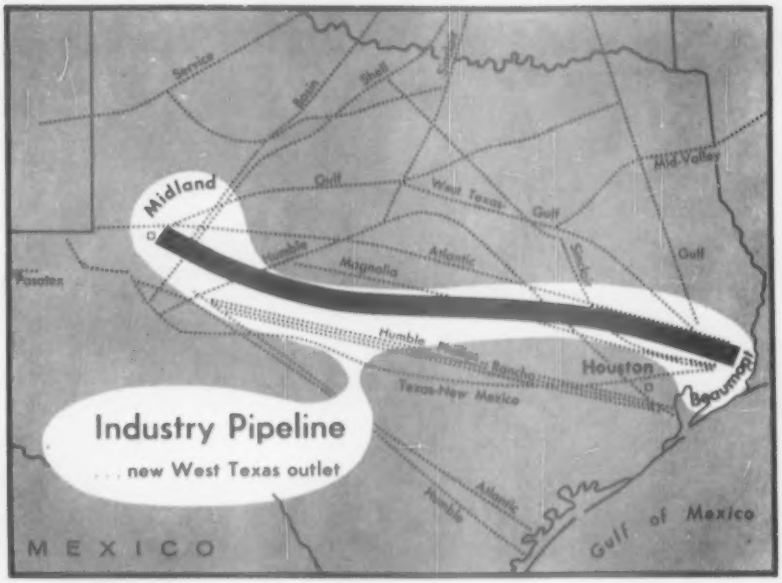
With an eye to getting the Suez Canal open so oil can move again, the British Admiralty last week advanced a three-step proposal to open it on a limited basis. The steps were:

. . . Clearing a through channel suitable for ships of 25-ft. draft and 64-ft. beam.

. . . Removing remaining wrecks from channel to enable complete freedom of navigation.

. . . Removing debris from the berth, general cleanup and dispersal of the wrecks from the canal.

No matter what plan is used, clearing the canal will be no quick job. That means the American oil industry must operate on an emergency basis for several months.



Big Crude Line Planned

● Several companies are behind line that will step up capacity from West Texas to gulf by 200,000 bbl. daily

DALLAS.—A major crude pipeline to provide for additional capacity of 200,000 bbl. or more daily from West Texas to the Gulf Coast is being studied.

The line would run from Midland southeast to Beaumont. Some 10 companies are discussing the project. But the exact structure of the new line—to be called Industry Pipe Line—has not yet jelled. Diameters of 20-in. and 30-in. have been proposed.

The additional capacity which this line would provide is needed now, because of the curtailed flow of Middle East oil to the U. S. and Western Europe. But in view of the tight pipe situation, it probably could not be built before 1959 or 1960 without government allocation of steel.

While the project might be accelerated by the loss of Middle East oil, it was conceived originally to meet normally increasing demand. It will be built regardless of whether the Suez crisis is resolved and Middle East oil resumes its normal place in the world supply picture.

Present capacity . . . The need for another major pipeline in the near future was pointed up by a study of the Industry line several months ago.

When officials met September 19, before the Suez Canal was closed and the Iraq Petroleum Co. pipelines were blown up, there was only 80,000 bbl. in spare capacity from West Texas to the Gulf Coast. That was taken up almost immediately as East Coast and Western Europe refiners scrambled for Texas crude to fill the gap. Another 200,000 bbl. daily above normal requirements could be moved north out of West Texas, so there's no expansion indicated in that direction in the near future.

Looping of present lines was ruled out. Studies showed it would be more expensive than building an entirely new, highly automatic line which could easily be expanded when demand justified.

Present pipeline capacity in all directions from the Permian basin of West Texas and New Mexico is around 1,950,000 bbl. daily on paper. Actual throughput is more than 400,000 bbl. below this figure, however, as pipelines seldom operate at 100 per cent of rated capacity even under ideal conditions.

Current projects will soon increase the Rancho Pipe Line system capacity to Houston by 25,000 bbl. daily. Four additional stations could raise capacity still another 100,000 bbl.

Humble Pipe Line Co. will be able to increase deliveries to Satsuma by several thousand barrels daily when its 94-mile, 18-in. Ector-Kemper line is completed in February. Throughput of Humble's 132,000-bbl. line has been some 40,000 bbl. daily below capacity.

Sun Goes All Out for Five Grades

- **Polls show customers like tailor-made blends, so stations in 19 states will be converted**
- **New superpremium will be marketed while changes are being made**

PHILADELPHIA.—Sun Oil Co. will extend its automatic custom blending of five grades of gasoline to its 19-state marketing area in the East and Midwest.

A 9-month trial of the revolutionary method proved so successful in Florida that Sun will complete the switch as soon as the single-grade pumps can be replaced, and dual fuel storage facilities installed.

The decision is a momentous one for Sun. Basically it is a complete departure from the company's traditional single-grade policy. Sun was the only major company in the nation to sell one grade which fell between the average regular and average premium grades of competitors, and sold at the price of regular.

From an investment standpoint, the decision was equally important.

In all but the more recently built Sun stations and bulk plants, underground storage and piping is designed for one grade. Facilities for handling the basic Blue Sunoco 200 and the high-octane concentrate must be installed. All conventional pumps will eventually be replaced by the new blending pump.

Interim change . . . Because it will take considerable time to make the necessary physical changes, Sun will make an important interim change next spring, when it introduces a superpremium gasoline as a companion product to premium Blue Sunoco.

This superpremium gasoline will be the same as one of the most popular blends of the five-grade system, but Sun has not yet revealed which one it will be. Blue Sunoco 250, marketed in Florida, is generally rated at 100.5 to 101 octane on the Wiese scale, which is due to be made official for all measurement above 100 research.

The sensitivity of this grade is reported to average about 7.7 numbers which is roughly comparable to the spread between research and motor ratings of Sun's basic grade.

Higher compression . . . Frank R. Markley, Sun's vice president in charge of marketing, pointed out that Sun had been searching for a system that would provide motorists an opportunity to choose from among a range of motor fuels in view of the trend toward higher and higher compression engines.

Sun weighed the costs and anticipated gains for several months after the Florida test was expanded state wide. A projected continuation of higher octane demand undoubtedly influenced the decision to scrap the single-grade policy.

Survey results . . . Market research and customer surveys tipped the scales. Markley says that the Florida experiment with custom blending provided clear and abundant evidence that motorists respond enthusiastically to this completely new way to buy gasoline.

The buying habits of more than 100,000 motorists at Sunoco and competitive stations were recorded. In addition, more than 30,000 Sun customers were interviewed. A special opinion poll by a private organization added weight to Sun's surveys.

Two to one . . . Sun customers favored the five-blend system two to one over the nearest competitive system. When asked which of several retailing methods they preferred, Florida motorists gave Sun top spot, Markley said.

Support also came from car dealers who attended demonstrations of the Sun system. There was no negative reaction from this group.

Another favorable point was the ease with which Sun's own dealers adapted themselves to handling the new blending system.

Other companies . . . What this decision will do to marketing practices in Sun's territory remains to be seen, but it will surely set the industry buzzing. Most of the major companies have committed themselves on the beefed-up premium vs. the third grade superpremium, at least for the present.

The lineup today finds Sun, Esso, Standard of Kentucky, Humble, and Cities Service firmly in the third-grade camp. Continental and others are market-testing a third grade.

Shell, Texaco, Sohio, Sinclair and others have followed the route of boosting premium grade at an added premium price in most cases.

Wide marketing area . . . The move will put Sun in a dominant position for years ahead, regardless of the trend in future octane requirements, Markley claims. It now markets throughout 19 states, including New England, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Florida, Ohio, Indiana and Michigan.

In addition the company is moving into southeastern Georgia and into the Greensboro-Durham-Raleigh section of North Carolina. It has for some time maintained retail outlets in several northern counties of Kentucky and has real estate personnel assigned to acquire new station sites in suburban Chicago.

This places Sun in direct competi-

tion with other superpremium grades along the Atlantic Coast. But in Ohio, Indiana, Michigan, and part of Illinois, it will be the first to offer the superpremium grade on a large scale.

Sun's conversion . . . Conversion work is already under way in a very few northern market areas. In addition, the company is planning to open a large number of completely new stations. New outlets including those leased or purchased numbered 386 last year, with a net increase of 141. A total of 474 new sites were obtained and construction had started on 175 of these by the first of the year.

New octane potential . . . To back up this marketing expansion, Sun has been building new capacity and new octane potential at its two refineries in Toledo and Marcus Hook. Catalytic reforming capacity now stands at 20 per cent of crude capacity and two new reformers are now planned for the U. S. refineries. A 1,300-bbl. alkylation unit is being built at Toledo to match a larger unit at Marcus Hook.

Sun's single grade now averages about 94.1 research octane and 86.4 motor octane. It seems probable that the company can handle a fairly large demand for superpremium grade in the 100-octane range.

Refining Firm Drills Hole for Waste, But Has to Settle for Oil

WICHITA.—Derby Refining Co. will have to try again for a place to dump its refinery waste products. But it's not likely anybody will complain much.

The company dug a hole early this month for that purpose, but drillers struck oil. The "test" is on the refinery property at the northwest edge of town. And it looks like a promising discovery. It is credited with about 3,100 ft. of oil and some water from drill-stem test.

Location is about 2 miles west of the old Hinkle pool. Total depth is estimated at 3,430 ft., with probable pay in the Kinderhook or Viola.

An early drill-stem test at 2,571-95 ft. recovered 114 ft. of mud and 361 ft. of salt water in an hour. Bottom-hole pressure was 245 psi.

In addition to the fact that Derby still doesn't have a place to dispose of its waste, the company has a couple of other problems. Nearby Excell Packing Co. holds the offsets in fee. And lease men have been swarming over the area since the strike.

watching WASHINGTON

. . . with Bertram F. Linz

Who pays the fiddler? . . .

WITH the ways greased for the relief of Europe's oil crisis the one big question yet to be settled is that of financing the program. The European nations, themselves, do not have and cannot raise the dollars needed to buy oil here on a long-term basis.

Congress, getting back in business in 3 weeks, may have something to say about the type of aid to be given. There are several courses open to the Government. At least two of them would take money out of the Treasury.

The original plan prepared against the closing of the Suez Canal last summer brought suggestions that the World Bank could make dollar loans to pay for oil bought here.

More recently, the idea seems to be that the U. S. should finance Europe's oil purchases directly. This could be done by grants under the foreign economic aid program. Now there is also the suggestion that oil sales could be handled in the same way as export sales of surplus farm commodities.

Under this plan, oil would be sold for soft currencies, which would be taken over by the Government. The sellers would be paid in dollars. The foreign funds could be used for specific purposes in the countries of issue.

If this method is adopted, it will be necessary to get the consent of Congress. That might take awhile, but officials say the matter is not pressing. Europe can finance a dollar-buying program for some time, it is believed.

Long live the king . . .

THE production worker in the oil refinery is king of the hill when pay envelopes are handed out.

He doesn't get the highest average hourly wage. His $2.58 is topped by the $2.84 for construction labor and the $2.80 of soft-coal miners. It is equalled by steel workers.

Work in the other industries, however, is affected by weather or other conditions. The result is that the weekly-earnings average in refineries last September, as reported by the Bureau of Labor Statistics, was $107.33. It topped the average in the other three industries by 93 cents to $1.29.

The bureau compared 1956 rates with those in 1947. It found that the average hourly earnings in refineries had increased 72 per cent and weekly earnings were up 76 per cent. In 1947 refinery earnings, both hourly and weekly, were the fourth highest in the 27 major industries surveyed.

Open season . . .

THE Justice Department will ask Congress next year to make business help convict itself of antitrust violations.

The department wants a law that would make business firms open their books and records to antitrust investigators. That would make it easier for the department to decide whether a civil suit is worth while.

The antitrust division doesn't have any trouble getting evidence in criminal cases. It just starts a grand jury investigation and calls for documents and oral evidence.

But antitrust officials complain that when they consider bringing a civil suit and ask to see a company's books they are often turned down. That makes more work for the department, of course. It has to set up a grand jury investigation and use subpenas. Or it may file a complaint and then gather evidence under the federal rules. A law permitting the attorney general to order books to be produced would be helpful, they say.

Union Weighs Automation

O.C.A.W. sees good and bad in automation, with more white-collar union members and weakening of strike tool

DENVER.—The Oil, Chemical and Atomic Workers International Union looks for automation to change the organization's structure, with white-collar workers eventually outnumbering the skilled, semiskilled and unskilled routine laborers in the oil and chemical industries.

"The shifting nature of industrial work means that sooner or later union membership, if it is to be effective, must include more people from the technical and professional fields," a spokesman for the union said last week.

"They are the working people of tomorrow."

O.C.A.W.'s oil industry membership is composed chiefly of pipeline, refinery and production workers.

Inability to strike . . . Predicting that technicians and engineers eventually will become so numerous they will no longer be company elite, the union said "perhaps they will be more receptive to organization then.

"Meanwhile, the categories of employes now generally unionized are becoming a smaller and smaller percentage of the work force in any given plant. In some cases, this already has grieveously weakened their strength to strike—and without the ability to strike a union is emasculated.

"It is false to presume that because the total number of employes will remain the same or grow larger, the union will remain as strong or stronger."

O.C.A.W. conceded that increasing numbers of supervisors and technicians "can keep many plants operating on a tolerable basis for a considerable time even if all the unionized workers choose to strike."

The union's view that automation is "good in the long run" is tempered with qualifications that "every effort should be made to prevent unemployment and adjust transfers for those men who already have given the productive years of their lives to their employers.

"The Union also holds to the position that as better equipment increases the flow of products, higher wages should be paid to bring about a sharing of these products and to provide a market for them."

O.C.A.W. said there must be cooperation between union and management in planning for automation if the changeover "is to be made as painless as humanly possible."

Automatic refineries . . . The union said the chief concern of refinery workers now is installation of devices which carry on continuous automatic blending of gasoline. The inroads of automation already have been felt by control employes affected by units which constantly scan, measure and analyze content and quality of feed stock or product, and by operators displaced by automatic logging."

O.C.A.W. noted that automation engineers already have designed a completely automatic refinery.

Pipelines, production . . . The strides of automation in pipeline operations have equalled or surpassed those in refining, the union declared. It quoted pipeline executives as saying it is entirely possible now — with existing equipment—to eliminate all manpower on pipelines.

The O.C.A.W. also has its eye on automation in oil production.

It was pointed out that several companies now operate leases on which control and scheduling, pumping, gaging, transfer of custody of oil from the producing well to the purchasing company, periodic well performance testing, separation and storage of oil and gas are all done automatically.

"On these leases there may be considerable periods of time in which no human being need set foot on the lease. Of course such leases are the exception rather than the rule as of now, but automatic lease controls are becoming more and more common."

Challenge and bugaboo . . . Automation presents working people with a challenge and a bugaboo at the same time, O.C.A.W. says.

In the union's opinion, it presents a challenge to the young man and to the parents of young men, because a young person can acquire new skills and training.

But, the union added, "to the man who has reached the well-settled years, whose technical education is more practical than book-learned, who is less flexible in learning new procedures, automation can be an alarming prospect."

Petro-Atlas Buys El Dorado

TULSA, Okla.—Petro-Atlas Corp. of Tulsa has acquired El Dorado Refining Co. of El Dorado, Kans., through a common-stock purchase deal. Petro-Atlas is controlled by Floyd Odlum's Atlas Corp., New York.

The deal involved 1,700 bbl. daily of crude production and 4½ million barrels of oil reserves in Kansas and an 18,000-bbl. daily refinery at El Dorado. The company, for many years a producing, refining, and marketing organization, will be operated as a subsidiary of Petro-Atlas.

D. R. Snow, formerly an executive of Sunray Oil Co. and the old Barnsdall Corp., is chairman of Petro-Atlas' board. Fay T. Anderson is executive vice president. El Dorado executives include T. A. Helling, board chairman; George J. Peterschmidt, president; Sam L. Roberson, executive vice president; and C. W. Rice, vice president for sales. Helling will retire, but other officers will retain their present positions. Principal El Dorado owners were Helling, P. C. Yankey, Mrs. R. E. Bradford, and their families.

Veteran refiner . . . The refinery is one of the oldest in the Mid-Continent area, starting as a skimming plant 40 years ago.

It now has well rounded processing facilities, including 5,000-bbl. vacuum capacity, a 12,000-bbl. catalytic cracker, a 1,200-bbl. polymerization unit, and a 1,500-bbl. asphalt plant. A 2,500-bbl. Platformer was completed this year.

The company markets its output through company-owned and controlled outlets and through independent jobbers located in the Middle West.

Atlas expanding . . . Acquisition of the El Dorado properties is another step in the Atlas program to expand its directly owned and operated oil properties. Earlier this year *(The Oil and Gas Journal, May 13, page 104)* the company announced that oil and gas companies which it controlled were being merged with Atlas Corp.

These companies have since been consolidated under the name of Petro-Atlas Corp. They include Airfleets, Inc.; Albuquerque Associated Oil Co.; San Diego Corp.; and Wasatch Corp. The properties have 5,000,000 bbl. of crude-oil reserves and 108,000,000 M.c.f. of natural-gas reserves.

Top officials pose for photographer as . . .*

J. & L. Opens New Offices

TULSA.—Jones & Laughlin Supply Division last Wednesday dedicated its new general office headquarters here.

The division now directs 27 district and sales offices and 90 oil-field supply stores in 17 states and 3 provinces in Canada. These stores and offices serve the industry from the Rocky Mountains to the Atlantic, and from the Gulf of Mexico northward through the Canadian drilling-producing areas.

Adm. Ben Moreell, chairman of the board of Jones & Laughlin Steel Corp., the parent organization, officially opened the building with a welding torch, cutting a strand of J&L wire rope at the entrance. Other speakers were C. L. Austin, J.&L. vice chairman; John E. Timberlake, vice president, sales; Rainey Elliott, president, Jones & Laughlin Steel Corp., Supply Division, Tulsa; and W. L. Wolfe, vice president of the Supply Division, Tulsa.

J.&L. Supply, formerly the Frick-Reid Supply Co., opened its first western store in 1905 in the Indian Territory which was to become the State of Oklahoma. The first store, in Bartlesville, recently celebrated its fiftieth anniversary of service. J.&L. Steel purchased a majority interest in Frick-Reid in 1928, and it became known as Frick-Reid Supply Corp. Frick-Reid became a wholly owned subsidiary of J.&L. in 1944.

Basically a sales organization, the J.&L. Supply Division merchandises tubular goods, production equipment, drilling equipment, wire rope, and refinery, chemical plant, and pipeline supplies to the petroleum industry.

*Left to right in photo: I. G. Sutter, general manager, administration services, J.&L. Supply; William L. Wolfe, vice president, J.&L. Supply; C. L. Austin, vice chairman, Jones & Laughlin Steel Corp.; Adm. Ben Moreell, chairman, J.&L. Steel; Rainey Elliott, president, J.&L. Supply; and John E. Timberlake, vice president, J.&L. Steel.

Tax Reprieve for Tidelands

BATON ROUGE.—Offshore oil operators are being offered a reprieve on payment of ad valorem taxes for property in the disputed area in the Gulf of Mexico.

A voluntary plan worked out last week by oil operators together with state and parish officials would permit companies to withhold payments until 90 days after "final determination" of the dispute between the state and federal governments. In the past, ad valorem taxes on property in the disputed zone have been paid under protest by several companies. Such payments have beeen placed in escrow pending outcome of the ownership fight.

Union Hits Off Louisiana

NEW ORLEANS.—Discovery of prolific oil production in a wildcat at the mouth of Timbalier Bay off the coast of Terrebonne Parish, Louisiana, is reported by Union Oil Co. of California.

In open water of the Gulf of Mexico, location is more than 2½ miles east of the big Caillou Island field, and 5 miles west of the sprawling Timbalier Bay field.

Completion is in a casing-perforated interval of 11,938-48 ft. Flow through ⅞-in. choke was at the rate of 228 bbl. per day of 34.9°-gravity oil. The well had been drilled to 15,010 ft.

Union's block totals more than 8,300 acres. The initial well is on its Louisiana Land & Exploration Co. State Lease 2826.

Peace River Grows

New gasoline plant will be third processing facility

FORT ST. JOHN, B. C.—The Peace River boom is continuing.

A 3,000-bbl. natural gasoline plant will be built at Taylor Flats, about 13 miles southeast of here, by Phillips Petroleum Co. and Pacific Petroleums, Ltd. It will push value of processing facilities in the area to $30,000,000.

The plant, which will cost over $13,000,000, will produce high-grade aviation gas as its principal product. It will take feed stocks from Pacific Petroleums' big gas-scrubbing plant going up nearby.

Included in the project are fractionating towers, a catalytic desulfurizer and reforming unit, a dehydrogenation unit, an isomerization unit, an alkylation unit, and blending, storage, and loading facilities.

Pacific will build the first section of the plant and Phillips will add avgas facilities. Each company will have an undivided 50 per cent interest in the operation.

The process . . . Propane and butane in the feed stock will be cracked to produce ethylene. Natural butanes will be isomerized and the resulting isobutane will be combined with ethylene to produce alkylate.

A third plant in the area is now under construction. Jefferson Lake Sulphur Co. is building a $2½ million facility to produce 300 tons of elemental sulfur a day. It will process hydrogen sulfide gas from the scrubbing plant.

Pacific's $15-million scrubbing plant will also remove propane, butane, natural gasoline, and other byproducts from the rich, wet British Columbia gas before it enters Westcoast Transmission Co., Ltd.'s outlet. The 30-in. line, which will run to Sumas on the Washington border, is due for completion next fall.

World Tanker Fleet

(Vessels of over 5,000 dwt. As of June 30)

Flag—	Number	Deadweight tons
United States	460	7,836,324
Great Britain	506	7,486,046
Norway	391	6,575,789
Liberia	219	5,024,027
Panama	175	3,220,140
France	102	1,930,328
Italy	113	1,801,904
Holland	94	1,409,119
Sweden	81	1,312,529
Japan	53	926,260
Denmark	47	789,043
Russia	45	471,871
Argentina	31	390,193
Germany	25	417,311
Spain	27	287,080
Canada	11	176,653
Brazil	14	223,800
Greece	15	227,209
Honduras	11	226,549
Venezuela	18	152,914
Others	81	1,127,406
Total	2,519	42,012,495

Source: John I. Jacobs & Co., Ltd., London.

On Order and Building

Country—	Number	Estimated deadweight tons
Japan	153	5,100,000
Great Britain	169	4,200,000
Sweden	115	3,000,000
Germany	88	2,500,000
Holland	72	1,800,000
Italy	55	1,650,000
France	45	1,500,000
Norway	68	1,370,000
United States	32	900,000
Denmark	26	700,000
Belgium	16	430,000
Spain	15	265,000
Others	5	75,000
Total	859	23,490,000

Source: Shipbuilders Council of America.

5-Year Tanker Plan to Take Billions

TANKERS now on order or under construction will increase the size of the world's tanker fleet by more than 50 per cent, and will cost a staggering $1½ billion each year for the next 5 years.

When this tonnage goes to sea, more than one-third of the world's merchant fleet will be engaged solely in carrying the products of one industry—oil.

But despite this huge increase in ocean-going oil tankers, the capacity may still be insufficient to meet the world's growing need.

As of June 30, 1956, the world tanker fleet consisted of 2,519 vessels of 5,000 tons or more. Their total deadweight tonnage was 42,000,000.

By November 1 there were 859 additional tankers on order or under construction, totaling 23,500,000 tons. Thus, the world fleet will aggregate more than 65,000,000 tons.

Oil demand climbing . . . The rapid ascendency of the tanker in international commerce is a byproduct of the fast-increasing world demand for oil which is growing faster outside the United States. Tankers are essential since the sources of supply and the principal markets are widely separated.

Two of the principal tanker-supplied markets are the U. S. East Coast and Europe. Demand for the principal refined products on the East Coast is approximately 3,000,000 bbl. per day. By 1961 it is expected to reach 3,750,000 bbl., an increase of 25 per cent.

Typical of the more rapid growth in demand outside this country is Western Europe, where demand for the principal products of crude oil averaged 1,800,000 bbl. daily last year. In 5 years, demand in these countries is expected to climb to at least 2,700,000 bbl. per day.

Will the growth in tanker capacity keep pace with the increase in demand for oil? Practically all foreign yards are booked to capacity for at least 3 years. Delivery dates run to 1961.

Only the United States has available capacity of consequence, and this probably will be cut considerably as result of recent action by the Government. The Maritime Administration recently revised its regulations to permit the transfer of relatively old vessels to more profitable foreign flag service.

Negotiations are now under way between owners and U. S. shipyards for construction of 45 tankers grossing almost 2,000,000 tons. Completion of these deals would more than double the number of tankers on order at U. S. ship yards and treble the tonnage on order. Currently, U. S. yards are working on orders for 32 tankers that total 900,000 tons.

High U. S. costs . . . Two factors militate against the construction of ships in the U. S.—lack of plate for one thing but, more importantly, high cost.

Cost of building ships in foreign yards has been as low as 50 per cent of U. S. costs. It has risen as the result of the tremendous demand for new vessels but is still only 65 to 75 per cent of U. S. costs.

Since construction costs in the U. S. range from $10,500,000 for a 32,000-ton tanker to $18,500,000 for one of 65,000 tons, a saving of from 25 to 35 per cent is a factor of real consequence. This saving ranges from $2,500,000 to $3,700,000 on a 32,000-ton vessel, most typical of those now being built.

Ocean-going vessels have an average useful life of 20 years so that a U. S.-built tanker must be amortized at a rate of $120,000 to $180,000 per year faster than a foreign-built sistership.

A comparison between U. S. and British costs follows:

Size—	U. S.	Great Britain
32,000 dwt.	$10,500,000	$ 6,300,000
65,000 dwt.	18,500,000	10,500,000

Japan edges Britain . . . Latest available figures show that Great Britain is leading in the number of tankers under construction or on order, but Japan is building the largest volume.

Great Britain has lost the leadership for several reasons: Lack of steel, labor, yards insufficient to accommodate the largest ships, and a much slower delivery rate than Japan.

It takes a British yard 1½ years to build a 19,000-ton tanker and almost 2 years to build one of 32,000 tons. Japan can deliver the former in 9 months, and the latter in 11—or in half the British time.

The Universe Leader . . . Today's tanker fleet is dominated by the Universe Leader, the 84,730-ton supertanker recently commissioned by an affiliate of National Bulk Carriers. It is the largest cargo ship in the world and is under contract to deliver Sumatra crude to the Standard Oil Co. of California refinery at Richmond. It is capable of carrying 620,000 bbl. of crude oil. It completed its maiden voyage early last month *(The Oil and Gas Journal, November 19, page 150).*

The Universe Leader was built in the Kure yards of the Japanese Navy since none of the commercial ways were large enough to accommodate a ship of that size. Her propulsion machinery and pumping equipment were fabricated in the United States, and shipped to Japan. This procedure is not uncommon.

National Bulk's affiliate, Universe Tankships, Inc., has three giant tankers on order. One will be slightly smaller than the Universe Leader, but two will be even larger—87,000 tons, with a length of 865 ft. This is 10 ft. longer than the Universe Leader. These ships will also be built in the Kure yards.

100,000 tons . . . As large as these ships are, they will lose their premier rating if the proposals before the Maritime Administration are approved. These include three 100,000-ton ships, two to be built for Aristotle Onassis and one for U. S. Petroleum Carriers. The last would be tops by a slight margin at 100,500 tons.

Economics are dictating this trend toward huge vessels.

Larger ships are:

. . . Cheaper to construct. Figures for U. S. yards show that the cost per ton of a 32,000-ton tanker is $328, while that of a 65,000-ton ship is $285—a 13 per cent saving.

. . . Cheaper to operate. Supertankers can deliver oil from the Middle East to Europe more cheaply by taking the 11,000-mile route around the Cape of Good Hope than an average size tanker can by using the 6,000-mile route via Suez.

A 45,000-ton tanker can make the voyage around the Cape at approximately 10 per cent less cost than a 20,000-ton ship through the Suez. A 65,000-ton vessel can save as much as 15 per cent.

Too big for Suez . . . Ships of 45,000 tons and over cannot use the Suez when fully loaded, a fact that presages an eventual lessening in the Suez value, since 70 per cent of its traffic is oil. These ships would normally use the canal on return trips in ballast.

Not only are these ships prohibited by their draft from using the Suez but, when fully loaded, they are also unable to enter most of the oil ports of the world. This is true of the two most important, Phiadelphia and New York. This certainly means that more submarine loading facilities will be installed.

Such facilities are relatively common now. One, a 3½-mile line at Lutong, Sarawak, was recently equipped with remote control devices so that incoming ships could control the flow. Another was recently installed in the roads of Le Croisec, near St. Nazaire, France. It is 1½ miles long and connects with a 25-mile pipeline serving the Donges refinery.

Despite the fact that supertankers are a relatively recent development, the end of 1956 will see more than 150 of them on the high seas. As recently as 10 years ago there were none. At that time the now outmoded 16,765-ton T-2 dominated.

The current trend is indicated by some recently reported orders:

. . . Esso Petroleum Co., Ltd., ordered four 45,600-ton and eleven 36,040-ton tankers in European yards.

. . . British Petroleum has 41 tankers building or on order, including eight of 32,000 tons, fifteen of 34,500 tons and seven of 42,000 tons and is reported to be considering five or six in the 60,000-ton class. These are on top of an existing fleet of 144 vessels aggregating 2,018,000 tons.

. . . Shell Tankers changed a year-old order for fifteen 32,500 tankers to include four of 38,000 tons, two of 46,000 and three of 60,000. This, in effect, increases its order from 487,500 tons to 625,000 tons, a 33⅓ per cent increase.

U. S. ranks first . . . Recent figures on the world tanker fleet shows that the U. S. still ranks first in tonnage though Great Britain is first in number.

The United States has retained first place despite low-cost foreign competition largely because only U. S. flag ships may pick up and discharge the same cargo in U. S. ports. This restricts the busiest oil traffic route in the world—Gulf to East Coast—to U. S. flag ships.

Norway, long a sea-faring nation, ranks third while, surprisingly to the uninitiated, Liberia and Panama rank fourth and fifth, respectively. Almost one-fifth of the world tonnage is registered under the flags of these two countries.

Tax havens . . . Neither Liberia nor Panama is a consumer or producer of oil of consequence and neither has an historical background in shipping. However both are "tax havens" and are used as corporation headquarters not only by ship-owning but by other international companies.

Profits realized under such operations can be utilized elsewhere in the world without being subject to U. S. taxes. The Internal Revenue Department is fully aware of the existence of such companies and does not object as long as good business dictates their being. Since U. S. shipowners could not otherwise compete with foreign flag ships, the propriety of this form of operation is unquestioned.

Cheaper wages . . . While almost 400 tankers fly the flags of Liberia and Panama, ownership is in the hands of nationals of other countries. A large portion is owned by U. S. oil compa-

nies and so-called independents. They have taken this step to be competitive.

As foreign flag vessels, they may employ foreign crews. The difference between U. S. and foreign maritime wages is very great so that the economy of foreign-flag operation is a matter of consequence.

The per day wages of a crew on an average U. S. tanker may run $1,400. Those of a foreign crew may be as little as $350 per day.

Atomic energy . . . Atomic power for supertankers is under study and may well become a reality in a few years.

North American Aviation has announced that it has begun a 6-month study on the design of a nuclear power plant for tankers. It is sponsored by the Atomic Energy Commission.

If the $1,800,000 program is successful, it would mean a substantial increase in the efficiency of tanker transportation.

Atomic propulsion would further increase the efficiency of the twin-screw supertanker by eliminating the need for bunkering stops and by making possible the utilization of fuel space for additional cargo. This latter depends on the space required for a nuclear power plant aboard ship.

At any rate, it will be a matter of many years before atomic propulsion is common in tankers, since all vessels now under construction employ oil-powered units and the average life of a modern ocean-going tanker is 20 years.

"The Greeks" . . . Not only has there been a drastic change in the size and nationality of the tanker fleets but there has also been a marked switch in ownership. Not many years ago 60 per cent of the tankers were owned by the oil companies and 40 per cent by independents.

Now the situation is reversed with 60 per cent owned by independents and 40 by oil companies.

This has given rise to such fabulous international figures as Daniel K. Ludwig, head of National Bulk Carriers, and "the Greeks," Stavros Spyros Niarchos and Aristotle Onassis. These individuals control fleets of 1,500,000 tons, 2,000,000 tons and 1,200,000 tons respectively. Their fast-growing fleets can now handle almost one-eighth of all the oil shipped across the oceans of the world.

Rates . . . Like most other aspects in the tanker business, rates also have soared in recent weeks.

A short time ago the rate from the Persian Gulf to the East Coast of the U. S. was $12 a ton. Now it is up to $48 a ton. This rate may take an additional jump upwards as Europe prepares for an oil-short winter.

FPC Approves Gas Line

Natural Gas Pipeline wins 2-year battle with Lone Star to lay line from Texas Panhandle to North Central Texas

WASHINGTON.—Natural Gas Pipeline Co. of America last week won a rugged 2-year battle to lay a big-inch line into North Central Texas.

The Federal Power Commission finally approved Natural's plan—which has been hotly contested by Lone Star Gas Co.—to lay a 20 and 26-in. trunk line from its present system in the Texas Panhandle through southern Oklahoma into the North Central Texas area.

The line will tap new gas supplies in Jack and Wise counties to bolster Natural's rapidly dwindling older sources in the Panhandle and other areas.

The 350-mile project from Fritch in the Panhandle will cost the company more than $32,000,000, of which $28,487,000 will be for the main line and $3,583,000 for a gathering system in the producing area and connections at Fritch.

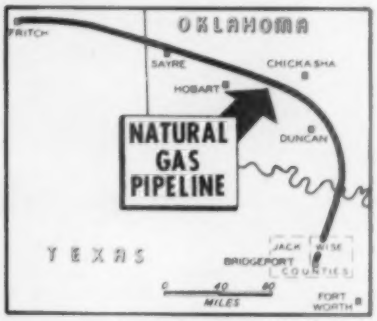
Revised price approved . . . The producers who will sell their gas to Natural also won a major victory. The FPC approved the revised contract price of 13.9 cents per M.c.f. In so doing, the agency overruled a prior decision by one of its trial examiners which approved the line but rolled back the price of the gas to 11 cents per M.c.f. *(The Oil and Gas Journal, February 13, page 92).*

The producers include Oil Drilling, Inc., which will sell the bulk of the gas; Sunray Mid-Continent Oil Co.; and Warren Petroleum Corp.

Capacity . . . Deliveries to Natural initially will average 78,000,000 cu. ft. daily. Capacity of the line without compression is 240,000,000 cu. ft. daily. Natural expects its gas needs to increase in the future and hopes to hike its take from the Jack-Wise County area and from producing areas in Oklahoma along the route of the line.

Lone Star denied . . . Loser in the decision was Lone Star of Dallas, which argued during the 2 years of intermittent hearings that approval of the National contracts would cost Lone Star customers $13,000,000 a year by forcing it to meet the higher gas price. Lone Star presently is paying about 11 cents per M.c.f. for gas in the Jack-Wise County area.

Lone Star had countered with a proposal to supply Natural's gas needs itself with a new 230-mile, 20 and 26-in. line it would build to Fritch from its existing system in Cotton County, Oklahoma.



It proposed to sell 100,000,000 cu. ft. daily to Natural at Fritch initially at a cost to Natural at Fritch of 20.6 cents per M.c.f. This would be about 40 per cent less than the 35.6 cents per M.c.f. Natural would have to pay at Fritch for the North Central Texas gas.

FPC, however, held that Lone Star's proposal was markedly inferior to the Natural project in meeting Natural's future gas demand. It held that Lone Star's plans for supplying more gas than it initially proposed were general and uncertain. Lone Star, it said, was in a position to offer gas to Natural only because of a relatively short-term surplus on the Lone Star system.

Sale approved . . . Though Lone Star's request to lay a line to Fritch was denied, the agency did approve sale by the company of the 100,000,000 cu. ft. of gas to Natural—but at a point in Stephens County in southern Oklahoma rather than in the Panhandle.

This physically would be a simple matter since the routes of the new Natural line and the existing Lone Star line intersect in that county. Moreover, Lone Star has its biggest gas surplus in the southern Oklahoma area.

Indications are that Lone Star will not contest the FPC decision in the courts and likely will accept the FPC certificate to sell gas to Natural in Stephens County.

A Lone Star official in Dallas said he felt the commission had erred in deciding that the company's current gas oversupply was a short-term surplus. Continued drilling in the company's supply area is a certainty, he said, and the surplus is sure to get bigger unless Lone Star locates large new markets.

Deadline Extended

Trans-Canada line delayed by difficult money market

OTTAWA.—Trans-Canada Pipe Line Co., Ltd., now has until February 1 to prove financial ability to build its $378 million natural gas pipeline from Alberta to eastern Canada (see related story on page 98).

This is the third deadline set by Canada's Board of Transport Commissioners in recent months. Original deadline was November 1, which was extended to December 1.

A. D. Nesbitt of Nesbitt Thomson & Co., Ltd., and a director of Trans-Canada, told the board that the interest rate for recently offered debentures might have to be increased because of the difficult money market. Present plans call for interest rate of 5¼ per cent.

Canadian interests are already committed for $30 million of the 5¼ per cent first mortgage bonds, and Paul Clarke of Lehman Brothers, New York, reports $80 million in sight from financial houses in the United States.

The current money market was described by T. H. Atkinson, a Trans-Canada director and veteran of 45 years in the banking business, as the most difficult he has ever seen.

Trans-Canada recently filed a statement with the Securities and Exchange Commission in Washington, proposing an offer of $80 million in debentures and $40 million in common stock.

Refiners Get Writeoffs

WASHINGTON.—Three refiners have been granted four certificates of necessity by the Office of Defense Mobilization for rapid amortization of $38 million in new refining facilities.

The largest grant went to Commerce Oil Refining Corp. which plans to build a 30,000-bbl. refinery at Portsmouth, R. I. Of the total estimated cost of this plant, 65 per cent of $15,368,000, 40 per cent of $15,743,500 and 15 per cent of $855,000 was earmarked for accelerated amortization. This plant has been in the planning stage for nearly 2 years.

Socony Mobil Oil Co., Inc., was permitted rapid amortization on 65 per cent of $2,116,000 and 45 per cent of $354,000 for a 9,000-bbl. per day Sovaformer at Trenton, Mich.

Ashland Oil & Refining Co. was granted two certificates. One, covering new capacity at Canton, Ohio, permits fast writeoff of 65 per cent of $1,900,000. At the Frontier Oil Refining Co. Division in Tonawanda, N. Y., new catalytic reforming and hydrodesulfurization capacity is being added.

Pipeline briefs

Westcoast Transmission Co., Ltd., has contracted to buy 65,200,000 cu. ft. daily of natural gas from Phillips Petroleum Co. in British Columbia. Phillips will supply an additional 150,000,000 cu. ft. daily when demand of the Peace River to Washington line justifies. The line is scheduled to begin operations next fall delivering 400,000,000 cu. ft. per day.

One of the biggest projects ever to come before the Federal Power Commission will be brought up for hearings January 7. It covers a $200,000,000 expansion by five companies in the Rocky Mountains and Midwest. Involved are Natural Gas Pipeline Co. of America, Texas Illinois Natural Gas Pipeline Co., Chicago District Pipeline Co., Pacific Northwest Pipeline Corp., and Colorado Interstate Gas Co.

The applications, consolidated by the FPC, cover construction of new line to permit Pacific Northwest to sell more gas to Colorado Interstate, which in turn would sell more to Natural. Natural, Texas Illinois, and Chicago District are subsidiaries of Peoples Gas Light & Coke Co.

Pioneer Natural Gas Co., Amarillo, Tex., has acquired full ownership of Pioneer Gathering System, Inc., which was organized to purchase and gather natural gas in West Central Texas now being flared for lack of a market. The company has a contract to supply Permian Basin Pipeline Co., Omaha, Neb., up to 200,000,000 cu. ft. per day.

Pioneer Natural also has organized Pioneer Production Corp., which will sell gas to the parent company. The producing subsidiary is carrying out a drilling program in Sutton County, Texas, and plans operations elsewhere in Texas and over the Mid-Continent.

Rangeland Pipe Line Co. will start building its 45-mile, 12-in. crude line from Sundre north to the Sylvan Lake-Bentley area as soon as weather and pipe supplies permit. Surveys are under way and arrangements are being made for pipe. Cost of the project will be $2,230,000. Go-ahead for the line was given 2 weeks ago by the provincial government.

River Construction Corp., Ltd., has started laying 150 miles of gathering system in the Peace River area of Alberta and British Columbia for Westcoast Transmission Co., Ltd. The contractor is an affiliate of River Construction Corp., Fort Worth. The system should be completed well ahead of the November 1957 deadline for starting deliveries through Westcoast.

Cities Service Gas Co. has received temporary authority to build and operate 60 miles of gathering lines in Grant and Alfalfa counties of Oklahoma. The facilities authorized by the Federal Power Commission would cost $1,288,600.

Humble Pipe Line Co. will be able to deliver 105,000 bbl. daily of crude from Ector County to its Kemper station in West Texas when a 94-mile, 18-in. line is completed in February. The project, started last month by Lone Star Construction Co., will permit full utilization of Humble's line to the Houston area.

Also for Pipeliners . . .

Pipeliners are playing a vital role in the U.S.'s program of getting almost 600,000 bbl. daily of crude to Gulf Coast ports (P. 80) . . . Several big companies are developing plans for a big-inch line that will move at least 200,000 bbl. of West Texas crude to the Gulf Coast (P. 83) . . . O.C.A.W. is watching automation in pipelining (P. 86) . . . Natural Gas Pipeline wins 2-year fight to build gas line from Texas Panhandle to North Central Texas (P. 90) . . . Trans-Canada's financing deadline has been extended from December 1 to February 1 (P. 91) . . . Service Pipe Line plans short crude line from Lake Washington in southern Louisiana to the Mississippi River (P. 95) . . . Trans-Canada construction continues despite subfreezing temperatures (P. 98) . . . Colorado Interstate may complete Rock Springs-to-Denver gas line this month (P. 103) . . . Canadian oil expert sees another crude line running to southern British Columbia (P. 104).

PLUS THESE TECHNICAL FEATURES: Rubberized asphalt mastic coating applied by extrusion aboard lay barge to 28 miles of pipe in Louisiana (P. 114) . . . Where does automatic custody transfer go from here? (P. 129) . . . Pipeline Patrol's construction tables (P. 149).

L.P.G. Stocks Building Up

PRODUCERS and distributors of L.P.G. put almost twice as much liquefied gas in storage between March 1 and October 31 this year as they did in the same period last year.

Plant production of L.P.G. for the first 15 days of November this year was slightly less than half the total November output last year. And the stock reduction during the first 15 days of November was only a small percentage of the total November reduction last year.

Stocks of L.P.G. normally reach a low point for the year at the end of February or March and increase until about the end of October.

Last year, total L.P.G. stocks at plants, terminals, and underground amounted to 195,417,000 gal. at the end of February. The total of 474,795,000 gal. at the end of October represented a net stock gain of 279,378,000 gal.

Plant, terminal, and underground stocks at the end of February this year amounted to 166,574,000 gal. and had climbed to 694,733,000 gal. by October 31. The last figure is from the semimonthly report of L.P.G. production and stocks by the statistics department of the American Petroleum Institute. The gain this year, February 29-October 31, was 528,159,000 bbl. or 1.9 times the increase last year.

Total plant production of L.P.G. for the first half of November this year was 262,485,000 gal. compared with 526,858,000 gal. for all of November 1955.

On a daily average basis, production for the November 1-15 period averaged 17,499,000 gal. daily, slightly less than the 17,562,000 gal. daily for all of November last year. The November 1-15 average was only 1.7 per cent greater than average production in September. Last year, production in November was 16.9 per cent above the average for September.

Stocks . . . Unless there was a very sharp drop in L.P.G. stocks for the last half of November, the over-all reduction for the month was much less than last year. The reduction for the first 15 days of November was only 2,188,000 gal. compared with a full-month drop of 59,327,000 gal. last year. Normally, colder weather in the last half of November increases demand which results in a larger stock reduction than in the first half, but the decrease can hardly be 27 times that of the first half.

The product breakdown of the 528,159,000 gal. increase in stocks between February 29 and October 31 is as follows: propane, 421,631,000 gal.; butane, 91,840,000 gal.; butane-propane mixture, 14,919,000 gal.; isobutane, 1,298,000 gal.; and other mixtures, a decrease of 1,529,000 gal.

Propane stocks increased 8,854,000 gal. during the first half of November, according to the A.P.I. report. The drop of 10,090,000 gal. in butane stocks accounted for the small over-all reduction in total L.P.G. stocks for the first 15 days of November.

Total demand for liquefied petroleum gases, L.P.G. and L.R.G., was down slightly in September from a year earlier. Total demand for September this year was about 5,000 bbl. daily less than a year ago, but the total for the first 9 months was up 14.5 per cent.

Inventories and Production—L.P.G. and L.R.G.

November 1 and November 15, 1956
(Thousands of gallons)

PRODUCTION OF L.P.G.

Area:	Propane	Butane	But.-prop. mixture	Isobutane	Other mix	Total
A	1,049	672	15	.....	4,574	6,310
B	12,286	3,222	667	1,072	9,892	27,139
C	21,676	6,492	2,456	1,095	211	31,930
D	22,734	8,957	10,434	2,806	2,152	47,083
E	13,602	3,621	2,921	4,802	10,092	35,038
F	37,873	35,958	7,098	8,466	963	90,358
G	4,723	1,287	106	.....	.....	6,116
H	11,760	2,578	1,909	1,475	789	18,511
Total, Nov. 1-15	125,703	62,787	25,606	19,716	28,673	262,485

STOCKS OF L.P.G.

A	7,070	3,248	21	.....	225	10,564
B	31,768	2,450	207	162	983	35,570
C	48,871	15,280	1,140	7,679	122	73,092
D	83,498	20,250	19,420	841	141	124,150
E	36,297	51,274	1,624	636	53	89,884
F	271,630	76,036	1,375	809	44	349,894
G	2,701	4,793	65	.....	.....	7,559
H	953	421	102	173	183	1,832
Total, Nov. 15	482,788	173,752	23,954	10,300	1,751	692,545
Total, Oct. 31	473,934	*183,842	24,383	10,657	1,917	*694,733

PRODUCTION OF L.R.G.

A	7,610	1,350	.....	.....	164	9,124
B	7,037	.....	.....	.....	29	7,066
C	4,024	1,144	236	.....	1,554	6,958
D	945	35	189	.....	508	1,677
E	15,779	23,448	659	.....	17,652	57,538
F	2,240	2,224	.....	.....	.....	4,464
G	1,200	23	.....	.....	21	1,244
H	6,253	4,336	521	.....	492	11,602
Total, Nov. 1-15	45,088	32,560	1,605	.....	20,420	99,673

REFINERY STOCKS OF L.R.G.

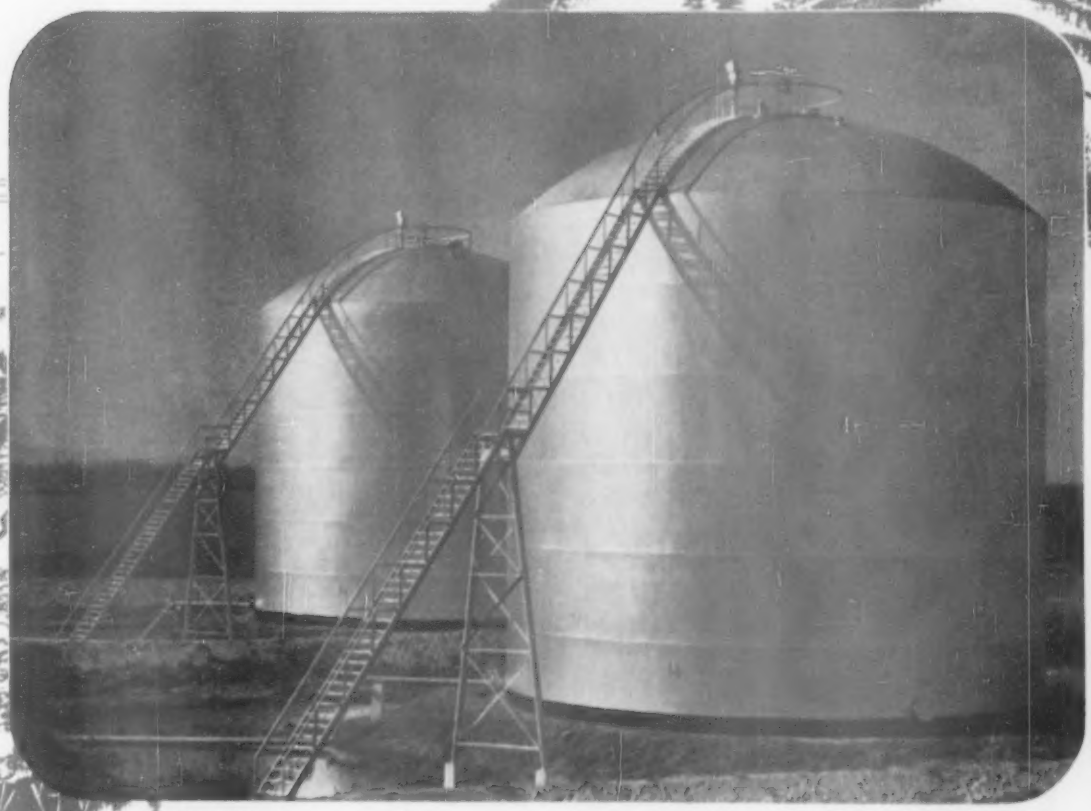
A	2,012	1,377	.....	.....	.....	3,389
B	3,479	937	.....	.....	499	4,915
C	2,459	1,183	192	.....	42	3,876
D	279	237	28	.....	18	562
E	1,422	7,716	76	.....	1,517	10,731
F	79	46	.....	.....	.....	125
G	254	8	.....	.....	.....	262
H	7,798	21,790	99	.....	746	30,433
Total, Nov. 15	17,782*	33,294	395	.....	2,822	54,293
Total, Oct. 31	19,430	33,421	536	.....	2,901	56,288

A includes all states in PAD District 1. B includes Michigan, Illinois, Indiana, Ohio, Kentucky, and Tennessee. C includes North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Minnesota, Iowa, Wisconsin, and Missouri. D includes Arkansas, East Texas, North Louisiana, Mississippi, and Alabama. E includes Gulf Coast areas of Texas and Louisiana. F includes West Texas and New Mexico. G includes Montana, Wyoming, Colorado, Utah, and Idaho. H includes all of PAD District 5. Data compiled by A.P.I.

*Revised.

STORAGE TIME

in the Green Mountain land



54-ft. 8-in. diam. by 48 ft. high Hemispheroids

HORTON HEMISPHEROIDS® are used for the storage of premium and regular grade gasoline at the American Oil Company Plant, Shelburne, Vermont. Here, in the land of Ethan Allen's fabled Green Mountain Boys, the two 20,000-bbl. Hemispheroids receive and store gasoline, for future local distribution, that has been produced at the company's Texas City Refinery and shipped by ocean tanker and then barge to Shelburne.

Horton Hemispheroids prevent excessive evaporation of volatile liquids as long as the internal pressure in the tank does not exceed the pressure relief settings of the valves. They are built in capacities to 30,000 bbls. and for working pressure to 5 lbs. per sq. in. in the smaller sizes.

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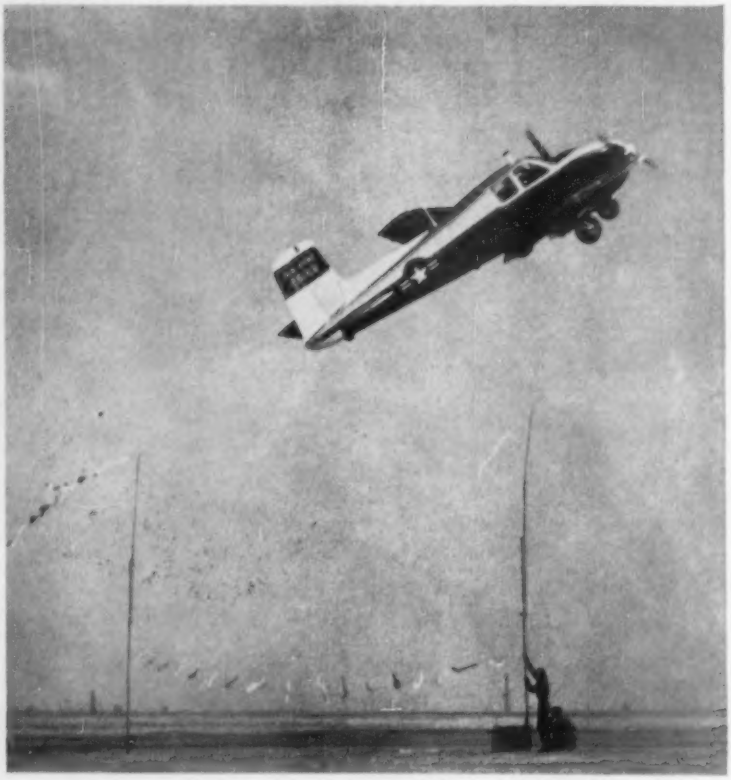
CAPABILITIES . . . Manpower, Tools and Experience

The amazing photograph at right was taken by Tom Ashley, managing editor of *Flight Magazine*, at the National Aircraft Show in Oklahoma City over the Labor Day weekend. It shows a U. S. Army L-23 Beechcraft making a successful takeoff and climb over a simulated obstacle, represented by the two poles. A previous takeoff by another make airplane had cut the upper ribbon, which the photo shows as broken. The number at the base of the pole represents the distance in yards from the beginning of the takeoff run of the L-23.



BEECH BUILDS	
	MA-3 MULTI-PURPOSE VEHICLES
	C-26, MD-3 POWER UNITS
	8-PLACE BEECHCRAFT SUPER 18
	6-PLACE BEECHCRAFT TWIN-BONANZA
	4-PLACE BEECHCRAFT BONANZA
	BEECHCRAFT T-34 TRAINERS
	BEECHCRAFT L-23 TRANSPORTS
	TANK-WING-MAJOR SUBASSEMBLY SUBCONTRACT PRODUCTION

The U. S. Army L-23B transport, rugged military version of the famous Beechcraft Twin-Bonanza, has a proud and distinguished record of service. First ordered into military production in 1952, the L-23 was the first twin-engine airplane used by the Army Field Forces. From the battle fields of Korea to the training fields at home, and back again to foreign stations, the L-23 has met the exacting demands of military service with distinction. Today, the Army's confidence in the L-23B's dependability and superior performance has resulted in new orders to fill the Army Aviation Division's expanding needs.

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Beechcraft

BEECH AIRCRAFT CORPORATION, WICHITA, KANSAS, U. S. A.

Canadian Projects Charted

● Cities Service plans Toronto refinery, new marketing outlets and expanded production in $30 million program

NEW YORK.—Cities Service Co. is budgeting a $30-million expansion program for its operations in Canada.

Plans call for:

. . . A $22-million refinery in the Toronto area.

. . . New marketing facilities with addition of service stations and bulk plants in Ontario and Quebec.

. . . Stepped up exploration and production in western Canada, principally in Alberta, where a promising potential has been built up.

The Canadian program is part of an over-all $750-million international expansion project in oil and natural gas which Cities Service will undertake over the next 5 years.

The refinery . . . The new refinery will be built by Cities Service Oil Co., Ltd.

Its design will enable the company to expand it readily from an initial 20,000-bbl.-daily capacity. Engineering contractor for the job is C. F. Braun Co. of Canada, Ltd., Toronto.

A conventional fuels plant is planned for the company's initial entry into Canadian manufacture. High-octane gasoline, heating oil, diesel fuel, tractor fuel, and heavy fuel oil will comprise the bulk of products. For a start, the plant will not manufacture asphalt, petrochemicals or other specialties. But they may come into the picture later.

Two-stage atmospheric and vacuum distillation, fluid catalytic cracking, catalytic reforming, and hydrodesulfurization will go into the new refinery. The final selection of licenses on all of these processes has not yet been made. But the plant will rank among the most modern when it goes on stream late in 1958.

General plans call for an advanced system of instrumentation. Both atmospheric and liquid wastes will be rigidly controlled to make Cities Service a good industrial neighbor in the highly concentrated Toronto area.

Why Toronto? . . . A site near Toronto was selected for two reasons:

. . . Crude from western Canada will be available by pipeline.

. . . Products can be moved readily throughout Canada's greatest area embracing southern Ontario and Quebec by water transport on the St. Lawrence Seaway or by rail and truck.

The plant will be designed to operate on an Alberta mixture delivered by Interprovincial Pipe Line. But it will also be able to handle other crudes of higher sulfur content and lower gravity.

The refinery will take over the supply of Cities Service products which have been marketed in the Ontario-Quebec region since 1921. This marketing system, operated by the same company, maintains about 700 service stations and numerous bulk plants. They are located throughout southern Ontario and in the Montreal and Quebec City sections of Quebec Province. From $5 to $8 million will be expended in intensifying this market over the next 2 or more years.

Robert J. Hull and V. E. Sicks have been active in Canada for several months, making plans for the new refinery. They will remain in supervisory positions during the construction and subsequent operation of the new plant.

Exploration . . . Another Cities Service affiliate, Canada-Cities Service Petroleum Co., is engaged in exploration and production in the western provinces.

Cities Service now has about 500 bbl. per day of actual production in Alberta. This comes from interest in 20 producing wells. But the potential is much greater.

Recently the company brought in new Cardium-sand production in a well drilled in the Keystone area about 6 miles east of Pembina proper. When development wells are drilled on this new strike, the company expects to add 2,000 to 2,500 bbl. per day to its Canadian production. Altogether, Cities Service holds over 1,000,000 acres under lease or reservation in West Central Alberta.

Suez prevented action by Ike . . .

. . . Imports Shutdown Delayed

WASHINGTON. — The question of oil-import control was put aside last week until the world situation clears up.

But oil importers were warned that if they pick up after the present European emergency where they left off when Middle East supplies were cut, the matter will be sent to the White House for action under Section 7 of the Trade Agreements Act.

Only the Suez crisis kept Mobilization Director Arthur S. Flemming from certifying that imports threatened to impair the national security.

The 1957 import programs filed with the ODM last month were far in excess of the volume based on the cabinet fuels committee's standard.

"This situation, without other intervening circumstances, would have left no course for me but to make a certification to the President," Flemming said.

Actual imports in the months immediately ahead will be below the committee standard, however, Flemming pointed out. There would be no point in starting a presidential investigation under such circumstances, he indicated.

When the end of the present situation can be foreseen, importers will be called upon again to report their import plans, Flemming said. The new figures will be reviewed and a decision made whether further action is necessary.

The recent developments in the Middle East have strengthened the conviction of cabinet committee members that the position they took last year is right.

The Government from now on is expected to bear down heavily on excessive imports.

The suspension of imports will give importers time to work out new schedules. There is some belief in government circles that the lesson given by the Suez Canal closing will not be ignored. But officials made it clear that it will be up to the importers to decide whether Middle East imports will be controlled by them or by the Government.

Service Plans Short Line

NEW ORLEANS. — Service Pipe Line Co. plans to start work immediately on a 12-mile, 10-in. pipeline to move crude from Lake Washington field in southern Louisiana to the Mississippi River near Port Sulphur.

From Port Sulphur the oil will be barged north to the Pan-Am Southern Corp. refinery at Destrehan.

Service reportedly is working out agreements to handle all the crude produced in Lake Washington field by John W. Mecom, Houston independent operator. It will control the Mecom production all the way from the wellhead to the refinery, eliminating intermediate transactions.

Pipe for the new line is now being delivered.

Three for ONE

COMPLETIONS BY BROWN PROVED IN THE FIELD

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IF YOU HAVE A PACKER PROBLEM — BROWN CAN HELP

Drilling Tender Is Maracaibo-Bound

ORANGE., Tex. — This barge-type drilling tender, just completed by Levingston Shipbuilding Co., soon will go to work in Lake Maracaibo.

It is the fourth such vessel completed this year for Creole Petroleum Corp. Known as a lake-type tender, the vessel will be used in conjunction with small drilling platforms in the Venezuelan lake. It is 180 ft. long, 70 ft. wide, and 11 ft., 3 in. deep. The South American-bound barge is one of three pieces of offshore drilling equipment just completed at the Orange, Tex., shipyard. Other equipment turned out during a 3-day period include a 180-ft. submersible drilling barge built for Brewster-Bartle Drilling Co., and a drilling platform for Magnolia Petroleum Co.

Special sound source means . . .

New Tool for Mapping Offshore

DALLAS.—Magnolia Petroleum Co. has perfected a new tool for mapping the ocean floor and the sediments beneath it to a depth of 80 ft. or more.

The instrument, named the Marine Sonoprobe, sends low-frequency sound waves through soft sediments on the sea bottom and records the echos bouncing back from the deeper hard formations.

Magnolia thinks the new technique will be applied widely for:

. . . Shallow offshore exploration. Company experience with the probe indicates it will reliably map shallow salt domes, buried crevices and valleys, shallow faults, and other geological structures.

. . . Mapping routes for underwater pipelines.

. . . Selecting platform locations for offshore drilling ventures.

It has also been used successfully in such nonoil applications as fixing the extent of silting in water-supply reservoirs and finding buried beds of oyster shells for use in road construction, cement, chemicals, and fertilizer manufacture.

How it works . . . The new tool is much like conventional echo recorders used for measuring water depths. The principal difference is a special sound source. Sound pulses from this source are of much lower frequency and much greater power.

The ocean bottom and sediment layers beneath it are displayed on a small television picture tube and profile recorded on electrosensitive paper.

Magnolia and its parent firm, Socony Mobil Oil Co., Inc., have flanged up a licensing agreement with Fairchild Aerial Surveys, Inc., of Los Angeles, to make the tool available to the oil industry and others.

Fairchild, a pioneer aerial-survey and mapping firm, will offer the soundprobe surveys on a world-wide basis.

Another version . . . Sea Engineering & Salvage, Inc., of Houston reports it has offered a similar device for commercial use in the Gulf of Mexico and the Caribbean since mid-summer.

Known as "Seaflor," the Houston firm's ocean-floor recording analyzer has been used in stratigraphic surveys for harbor work in Haiti and for similar work by a Mexican affiliate, Mares de Mexico, S. A.

The unit, operated from surface craft, is said to penetrate the ocean bottom 60 or 80 ft. to record information previously requiring core drilling.

Industry briefs

Union Oil Co. of California has turned over management and operation of its tanker fleet to Pacific Coast Transport Co. Seagoing personnel and a number of employes in the company's marine department will be employed by Pacific Coast. The changeover is in line with Union's policy of contracting services not directly connected with oil production, manufacturing, and marketing.

University of Texas is $3,881,000 richer as the result of a recent oil and gas lease sale on 34,471 acres in West Texas. This brings to $272 million the university's permanent fund endowment. The school has been authorized to invest half of this fund in corporate securities. Previously, only government bonds could be purchased.

Stanolind Oil & Gas Co. paid top price at the recent sale—$335,000 for 315 acres within 3 miles of South Andrews, Wemac, and Bakke Ellenburger fields, Andrews County.

Hearings on new regulations relating to the depletion allowance for oil and gas will open before the Internal Revenue Service January 8.

The proposed rules will deal with the tax treatment of separate properties and the possibilities for combining them to secure the depletion allowance as a unit. The rules also will cover the option to expense or capitalize intangible drilling and development costs.

Kerr-McGee Oil Industries, Inc., plans a $1.9 million addition to its headquarters office building in downtown Oklahoma City. The new structure will be built adjacent to the company's present building on the east. It will feature a 11-story tower and a roof-top landing field for helicopters.

Kansas daily crude production for December has been boosted 3,000 bbl. by the Kansas Corporation Commission. The December production allowable will be 338,000 bbl. daily. The increase is about equal to underage accumulated under recent pipeline proration.

Lost Canyon Uranium & Oil Co., Denver, has announced the purchase of 10 per cent of New Mexico Natural Gas Co. The purchase price was not disclosed in the announcement by Theodore J. Doerrie, Lost Canyon president. The New Mexico firm owns interests in 45 gas wells and 35,000 acres in San Juan County, New Mexico.

FIRST MAJOR RIVER crossing of Trans-Canada line was made at the icy Assiniboine River near Miniota, Manitoba.

Trans-Canada Fords First River In Race Against Winter's Grip

WINTER hits early and hard in the prairie provinces of Canada, but that doesn't seem to deter laying the 575-mile western leg of the Trans-Canada natural gas pipeline. The 2,250-mile transcontinental line will carry natural gas from Alberta to eastern Canada.

With more than 250 miles underground, the first major river crossing was accomplished at Miniota, Man., when the 34-in. line was pulled across the frozen Assiniboine River. The dual crossing at Miniota will be followed by dual crossing of the same river near Portage La Prairie, Man.

Ditch for the first crossing was 10 to 15 ft. deep in the bed of the river. Over-all length of the crossing was 1,300 ft. Pipe was encased in 30 six-thousand-pound concrete river weights and lowered by three side-boom tractors on to dollies which ran on rails to the water's edge.

Officials of Trans-Canada Pipe Lines, Ltd., said that despite subfreezing temperatures, the weather so far this winter has been considerably more favorable than at the same time last year.

Original completion date for the western leg was set for the end of 1956, but various delays, including the U. S. steel strike, has set the date back. Completion is now expected late next summer.

HEAVY CLOTHING helps offset cold winds for welders, who are working behind a wind screen.

ICE-BOUND survey party (in boat above) solve their sounding problem by boarding the bucket of a drag-line, which broke the ice.

CONCRETE WEIGHTS, placed on a 260-ft. section of pipe, weigh 6,000 lb. each. Sections were hauled to shore on marine railway.

New Ethylene Plant

Cities Service and Conoco expanding complex on gulf

LAKE CHARLES, La. — Petroleum Chemicals, Inc., has started construction of a multimillion-dollar petrochemical plant here to produce 200-million pounds of ethylene annually.

The project marks another major expansion into the petrochemical field by Cities Service Co. and Continental Oil Co., joint owners of Petroleum Chemicals.

The new plant is being built adjacent to the company's butadiene facilities. Completion is scheduled for January 1958. Lummus Co. is contractor.

Refinery gases from nearby Conoco and Cities Service plants will be used as raw material in production of ethylene.

Bruce K. Brown, Petroleum Chemicals president, said the new plant will be one of the first to offer commercially both standard and high-purity grades of ethylene. F. M. Simpson, executive vice president of the company, is in charge of the ethylene project.

Petroleum Chemicals, Inc., went into the petrochemical business in 1955 by purchasing the government-owned butadiene plant here which formerly was operated by Cities Service Refining Corp. A recently completed expansion project boosted the plant's butadiene capacity from 65,000 to 80,000 tons per year.

The company also is adding a $12,500,000 anhydrous ammonia plant which will have a capacity of about 300 tons per day. Completion of the ammonia plant is due late in 1957.

Blackfoot Deal Faces Snag

WASHINGTON.—The deal for a single oil company to manage the Blackfoot Indian Reservation is apparently doomed.

Interior Department officials said last week it appears to be held up somewhere along the line. They had received only unofficial copies of the proposal. And when it comes up for a vote, they will probably kill it. One spokesman expressed "grave doubts" that the department will turn over its responsibilities of supervising activities on the tribal lands to private enterprise.

The secretary of the Blackfoot tribe has also raised some objections, despite the fact that the tribal council voted in favor of the deal. A similar proposal was made several years ago, but was not approved.

Processing briefs

An independent union, Baytown Employes Federation, has approved a new 2-year contract with Humble Oil & Refining Co. The agreement provides varying wage increases for certain job classifications at the Humble plant, based on average pay at other Gulf Coast refineries. Union workers had been without a contract since March.

Chicago Corp. of Fort Worth will merge with its wholly-owned subsidiary, Champlin Refining Co., and change its name to Champlin Oil & Refining Co. at the end of the year. Chicago Corp. acquired Champlin about 2 years ago and recently completed a modernization program at the Enid, Okla., plant. Capacity was boosted from 17,000 bbl. to 31,000 bbl. daily.

Tidewater Oil Co. has awarded contract to Bechtel Corp. for constructing a 22,500-bbl. Houdriformer at its Avon refinery near San Francisco. Work will start on the plant early next year and will be completed in 1958.

Work is completed on a 20-mile railway spur connecting British American Oil Co.'s new sulfur-extraction plant near Pincher Creek with the Crowsnest line of Canadian Pacific Railways.

Plant work itself is now progressing after brief delays caused by two minor strikes. The British American plant will supply sulfur to the recently opened Northwest Nitro-Chemical plant at Medicine Hat.

American Cyanamid Co. has introduced a new hydrogen-treating catalyst called Aero H.D.S. The improved cobalt-molybdena catalyst has high-volume activity and excellent mechanical properties which will permit refiners to get longer on-stream service life. Higher active metal content, superior porosity and low bulk density also are claimed. The latter will allow use of fewer pounds in a unit, or permit boosting capacity with the same amount of new catalyst.

Texas Natural Gasoline Corp.'s new natural-gasoline recovery plant, 30 miles southeast of Glendive, Mont., is scheduled to go on stream this week. The plant will process wet gas from the Pine and Cabin Creek fields in Wibaux and Fallon counties.

Coastal Chemical Corp. has awarded a $2,000,000 engineering and construction contract for a phosphate fertilizer plant at Pascagoula, Miss., to Fluor Corp., Los Angeles. The plant will include a 75-ton-per-day phosphoric acid unit and a 350-ton-per-day granulated ammonium phosphate fertilizer unit.

Fuel injection will get a tryout on two more 1957 model cars, Pontiac and the Rambler Rebel. Pontiac will install it on a new model to be produced on a limited basis. It will have a V-8 engine expected to turn up 300 hp.

American Motors will offer its 225-hp. V-8 Rambler with the Bendix system as optional equipment. With the injection system, it will have 288 hp. The Bendix injector nozzles are actuated by transistor-equipped electronic controls which time the closing with a few milliseconds.

Also for Refiners . . .

A steady flow of crude oil is beginning to arrive at European refineries as U. S. industry moves almost 600,000 bbl. daily from Gulf Coast ports (P. 80) . . . Sun is developing plans to sell its five grades of gasoline throughout its 19-state marketing area (P. 84) . . . Derby Refining comes up with an oil discovery while drilling a salt-water disposal well (P. 85) . . . O. C. A. W. is keeping close tab on automation, says it will change makeup of union membership . . . Floyd Odlum's Petro-Atlas Corp. buys El Dorado Refining Co. (P. 86) . . . Phillips Petroleum will build natural-gasoline plant in growing processing center planned near northern terminus of Westcoast Transmission pipeline (P. 87) . . . ODM grants tax writeoffs to three refiners (P. 91) . . . Slow demand shows winter L.P.G. stocks are building up (P. 92) . . . Cities Service plans big Canadian program that includes 22,000-bbl. refinery near Toronto (P. 95) . . . Petroleum Chemicals starts construction of ethylene plant near Lake Charles (P. 99).

PLUS THESE TECHNICAL FEATURES: Desulfurizing due to grab off bigger share of refinery runs (P. 109) . . . Electrical precipitation at Houston plant increases steam-stripping rate and ups output of virgin gas oil (P. 111) . . . On the Job . . . In the Plants (P. 124) . . . Prefab wall makes cooling pond do double duty for Cosden (P. 136) . . . The Foreman's Page (P. 143) . . . Field Processing (P. 147).

Streamlined Reports

Simplified forms urged by committee; they would be easy to fill out, easy to file, and the same for every state

MIAMI BEACH.—A simplified, uniform set of report forms has been recommended for all states by a special industry committee.

The committee made its report to the regulatory practices committee of the Interstate Oil Compact Commission, holding its winter meeting here, and urged that the commission work toward adoption of the forms by all states.

Great savings of time and money to oil and gas operators as well as to the regulatory commissions can be made by use of these forms, it was predicted by the industry committee chairman, O. P. Nicola, Jr., of Phillips Petroleum Co. in Bartlesville, Okla.

The proposed set of 33 standard forms, the committee said, would provide all the information needed by the regulatory practices of 30 oil-producing states, and two Canadian provinces, and probably the U. S. Interior Department.

One for all . . . They would replace scores of different state forms of various sizes, shapes, and arrangement. Substantially the same information is required by most agencies, but in a different way. The new forms are designed so states can use them without change for almost any type of report.

If the uniform system is adopted, operators will realize these advantages:

. . . Clerical employes can quickly learn to fill out the forms correctly. The same data will always go in the same places.

. . . Carbon copies can be made for company records, and the company file will be uniform even though it includes reports for several states. Some present forms are on cards, making carbons impossible.

. . . Typewriters can be used to fill out the forms and some of them are especially adapted to machine tabulation.

. . . Numbers will be the same for individual reports in every state. The committee believes the forms will be adequate for nearly all company records, particularly of smaller operators.

. . . Reduction in number of forms used, since some of the new ones combine two or more now used in some states.

The committee concluded that only 27 of the 33 recommended forms are essential for proper and efficient administration of any state conservation program. The others were included to provide uniformity in states which require them.

The set includes an organization report, 19 producer's forms, nine gas forms, one transporter's and storer's form, one refiner's form, and two carbon-black forms. Those set up for optional use on I.B.M. accounting machines are the monthly-producer's report, gas-purchaser's report, gasoline-plant operator's report, and transporter's and storer's report.

After comparing information required by all states and provinces under study, the industry committee drafted tentative forms including all the essential data. These drafts were then turned over to Standard Register Co., a firm specializing in simplifying business records and report forms.

Standard Register, at no cost to the compact, or the committee, rearranged the data in ways that would be most logical to present and easiest to type, and also in close conformity to the practices of most oil companies.

Easy change . . . Most states could adopt the new reporting system without amending their statutes, the committee concluded. However, a number of changes in regulations may have to be made, and to this end the committee recommended revisions in the compact commission's so-called model state regulations.

One big change is to drop the requirement that forms be notarized.

Also, instead of making the person filing the report swear that he has personal knowledge of the facts, the new forms state that the signer is authorized to file them on the responsibility of the company or operator.

As airport officials see it . . .

. . . Black Ink Flows From Wildcat

PAULS VALLEY, Okla.—City officials are ready to switch the color of ink in their municipal airport bookkeeping.

The airport has been winding up every year several thousand dollars in the red. But a wildcat discovery on the property promises to change all that.

R. A. Hefner, Jr., of Hefner Production Co. in Oklahoma City, brought the well in. It is flowing through 2-in. tubing at its wildcat allowable of 150 bbl. daily from 3,620-26 ft. The well was plugged back from 4,975 ft.

Tubing pressure is 20 psi. and gas-oil ratio is 20 to 1. On test, it flowed 121 bbl. in 24 hours through 18/64-in. choke. Goldsmith Drilling Co. of Duncan was the driller.

Crude is being trucked 5 miles to Service Pipe Line Co.'s lines, but Hefner hopes to get a gathering line to the well soon.

More wells coming . . . Hefner's contract calls for two more wells on the property. If they come up to expectations, 13 holes will be drilled on the 435-acre lease. Wherever obstructions aboveground would present hazards to aircraft operation, pumps would be buried.

City officials are ready to go all out to aid the search for more oil. Civil Aeronautics Administration officials are cooperating, too. If necessary, they are willing to close runways and even the airport itself until wells are completed and production can be carried out with no obstructions above the ground level.

Harry Hurd, Hefner's production chief, doesn't believe the next well will close any runways. But others might. No drilling operations can be carried out closer than 150 ft. to taxiways and 500 ft. to runways.

But that's all right with Pauls Valley. It is estimated the city coffers will register $200 a month from each well. And that looks a lot better than red ink.

Howe-Baker desalting units at Esso.

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Gas Line to Denver Nears Completion

RAWLINS, Wyo. — If the weather doesn't act up again, Colorado Interstate Gas Co. should complete its 380-mile, 22-in. gas line from Rock Springs, Wyo., to Denver this month.

Pipe laying on the 238-mile leg from Rock Springs to Laramie, Wyo., was delayed by a mid-November blizzard. Latest progress report showed the contractor, R. H. Fulton & Co., had about 30 miles to be welded, less than 8 miles of ditching and stringing, and about 45 miles of filling.

The project was halted in July by the steel strike. The pipe supply was exhausted shortly after it was begun.

Oil compact inquiry explained . . .

...Control Not Goal, Hansen Says

ALBUQUERQUE.—The Justice Department denied last week that its investigation of the Interstate Oil Compact is designed to pave the way for federal supervision of the states' conservation activities.

The inquiry, ordered by Congress, is aimed only at uncovering any antitrust violations or anticompetitive tendencies "in business activity," Assistant Attorney General Victor R. Hansen, head of the antitrust division, told the New Mexico Oil and Gas Association.

Hansen appealed for the aid of the states and their conservation bodies "to obtain necessary detailed information about industry operations which we do not already possess."

"I am sure that you will do all you can to assist in a task which will contribute to the proper enforcement of the antitrust laws," Hansen said.

"And in the enforcement of those laws, as it may concern your industry, you may be sure of our intention to recognize and understand your problems. . . Our various oil suits and the Oil Compact studies have afforded me a better understanding of the complexities of your domestic industry. You may be sure that we are making an enlightened attempt to do the best we can to preserve a truly competitive petroleum industry."

Hansen noted that the Government has four suits against the industry pending in the courts. They are the Sun Oil Co. case, involving exclusive dealing; the West Coast monopoly case, the so-called cartel suit, and a group of charges against Socony Mobil Oil Co. involving distributive practices.

The West Coast suit, the only one Hansen would discuss, charges that seven major companies own or control 85 per cent or more of the production, refining and marketing facilities.

In this case, "apparently misunderstood by so many in the petroleum industry," the Government is asking divorcement of marketing, dissolution of the Conservation Committee of California Oil Producers, among other things, Hansen said.

Union Hits in Oklahoma

McCORMICK, Okla.—A promising wildcat has been completed in Woodward County by Union Oil Co. McCormick-Union 1 flowed 10 million cubic feet of gas a day with "a considerable ungaged amount" of distillate through a 14/64-in. choke with 3,000 lb. flowing pressure.

The well was completed in the Morrow sand at 8,200 ft. It is 35 miles southeast of the nearest Morrow sand production in Harper County. Union holds leases on 15,000 acres in the vicinity of the well and nearly 60,000 acres along the trend.

Sam Grinsfelder, vice president for exploration, described the discovery as "an important find as it opens up a considerable new area for prospecting of the Morrow sand."

Salt Domes of East Texas Continue to Beckon Explorers

ATHENS, Tex.—Oil possibilities of the 18 piercement salt domes in East Texas have been attractive to operators for years. But until this year, only two of the domes had produced.

Now, a program to test the LaRue dome in southeast Henderson County is about to get under way. C. L. Norsworthy, Jr., has made location for one of three wildcats to explore for sub-Clarksville sand pinchouts and domal faulting.

The area is about 25 miles northeast of Bethel dome in Anderson County, where The Texas Co. recently made two small wells after drilling through the salt overhang.

Norsworthy is conducting his search under a deal worked up by W. C. Perryman of Athens. It involves approximately 4,000 acres obtained from Shell Oil Co., I. P. LaRue of Dallas, J. S. Abercrombie, Delta Drilling Co., and Grelling estate of Tyler.

The first test is 1 J. S. Abercrombie, 3 miles northeast of LaRue townsite, on the dome's east flank. Location is in the Simon Boone Survey. The tests will go to 4,800 ft. or into the Woodbine. Iran Drilling Co. of Longview will drill all three wells.

Previous results . . . Oil was found at Bethel dome in Anderson County, and Hainesville dome in Wood County this year. The only previous producers were Boggy Creek and Concord domes. Concord has since been depleted.

British-American opened production on Hainesville at its 1 Wisenhunt. This well went into the salt overhang at 1,795 ft., came out at 5,690 ft., and found oil in the Woodbine at 9,215 ft.

The Texas Co. found first commercial oil on Bethel at its 2 Williams, which went into salt at 1,654 ft., came out at 4,500 ft., and found Woodbine oil at about 5,600 ft.

New Line Forecast

Canadian predicts second big pipeline to West Coast

CALGARY.—Construction of a second crude-oil line parallel to the 800-mile Trans Mountain line to the West Coast is forecast by Carl Nickle, Calgary oil man and oil and gas expert in the Canadian Government's Opposition.

He did not say who would build it or when, but estimated cost of such a project would be about $100,000,000.

Trans Mountain Oil Pipe Line Co. has already announced it will expand its system from 184,000 to 300,000 bbl. per day, probably by looping 50 per cent of the line *(The Oil and Gas Journal, November 19, page 151)*.

Nickle sees a new line as a logical development to provide a further outlet for increasing production of western Canada oil. It would combine an economic outlet for normal peacetime development and a route to the most likely markets should war occur or current Middle East troubles continue.

Nickle considers it unlikely that western Canada's oil will be taken by pipeline to the Montreal market as a new 2,000-mile big-inch line would have to be built along with an extension from Toronto to Montreal.

Both Trans Mountain and Interprovincial Pipe Line Co., which moves crude to eastern Canada, are planning expansion programs which will give spare capacity of 58,000 and 62,000 bbl. daily, respectively. He estimates that next year the market for western Canada crude will increase from the present 490,000 bbl. daily to 620,000.

Refinery expansions in the U. S. Pacific Northwest, he said, will increase demand in the next 3 years by 150,000 bbl. daily.

Offshore Rules May Change

SACRAMENTO.—The State Lands Commission will make a fight before the legislature next month to get the state a larger slice of offshore oil revenues.

The commission plans to ask the legislature to amend present royalty provisions of the Cunningham-Shell Act. The amendment would permit the commission to apply escalator royalty clauses in leases involving tide and submerged lands classified in wildcat areas.

Under present terms of the act, leases on wildcat lands bear a flat 12½ per cent royalty. Sliding scale royalty provisions on lands classified as on a known producing structure start at 16⅔ per cent.

The move taken by the commission drew strong opposition from the oil industry. Its spokesmen declared the proposed change would destroy incentives for doing expensive offshore exploration work.

Paul Lower of Superior Oil Co. said, "if further roadblocks are going to be placed in the path of California oil companies, the offshore deposits will remain underground, undiscovered and unproduced."

Gatchell Unitized

Union operator of unusual Polvadero pool zone plan

LOS ANGELES.—Operators and lessees of lands within the Gatchell zone of the Polvadero pool, Guijarral Hills field, Fresno County, agreed to a unitization plan effective December 1.

Union Oil Co., with 79 per cent working interest in the zone, was named operator.

Others in the unit include Standard Oil Co. of California, Superior Oil Co., F. I. Sanger et al. Helm Co., and Robert Sumpf et al. Only Standard and Union have production in the unitized area.

The agreement covers 4,771 acres of which 800 acres have proved production. A unique feature of the plan is that all parties agreed to it before the pool was completely defined. Extension drilling is still being done. But the agreement covers new development wells as the area is drilled up.

Union discovered the pool in February 1955 with 55-1 Bourdieu. Initial production from the discovery was 2,929 bbl. daily of 30°-gravity crude from 10,737 ft. The pool now has 26 wells producing approximately 2,000 bbl. daily. Cumulative production to December 1 was about 1,985,000 bbl.

Pipe Supply Falling Short

WASHINGTON. — Output of oil-country tubular goods is not keeping pace with accelerated drilling operations. Indications are that the supply in 1957 will be only 150,000 tons greater than the 2,550,000 tons produced this year, government officials say.

The only new plants to come into operation next year will be an electric weld mill making 5⅝ to 5¾-in. line pipe, and a few other facilities which also will add to supply.

Unless the Government sets a new expansion program for the steel industary, only one new plant will come into operation in 1958. This will be a seamless mill to produce pipe ranging from 4½ to 9⅝ in.

Alberta Demand Up

New nominations reflect West Coast market growth

CALGARY.—Growth of the West Coast market for Alberta crude oil is reflected in December nominations of 447,896 bbl. per day.

The new nominations, highest in recent months, are just 800 bbl. below the all-time high of 448,696 bbl. established last August.

Of December's production, 193,075 bbl. daily will go east through the Interprovincial pipeline, and 154,521 will be carried west through the Trans Mountain line.

Refineries in the United States have asked for 123,216 bbl. daily, as follows: Shell Oil Co., Anacortes, Wash., 40,400 bbl. per day; General Petroleum Corp., Ferndale, Wash., 38,561; Northwestern Refining Co., St. Paul Park, Minn., 14,000; Standard Oil Co. of California, 12,000; International Refineries, Wrenshall, Minn., 11,290; Bay Refining Corp., Bay City, Mich., 6,000; Dow Chemical Co., Midland, Mich., 600; Union Oil Co. of California, Cut Bank, Mont., 265; and Phillips Petroleum Co., Great Falls, Mont., 100.

Imperial Oil Co. continues to lead as high bidder, with nomination for 162,525 bbl. daily. Shell Oil Co. requested a total of 56,100 bbl.; British American Oil Co., Ltd., 43,765; and General Petroleum Corp., 32,500.

Long Beach Flood Approved

LONG BEACH.—Plans for a 180,000-bbl. daily water flood on city properties of the Wilmington field's harbor area have been approved by the Long Beach Harbor Department.

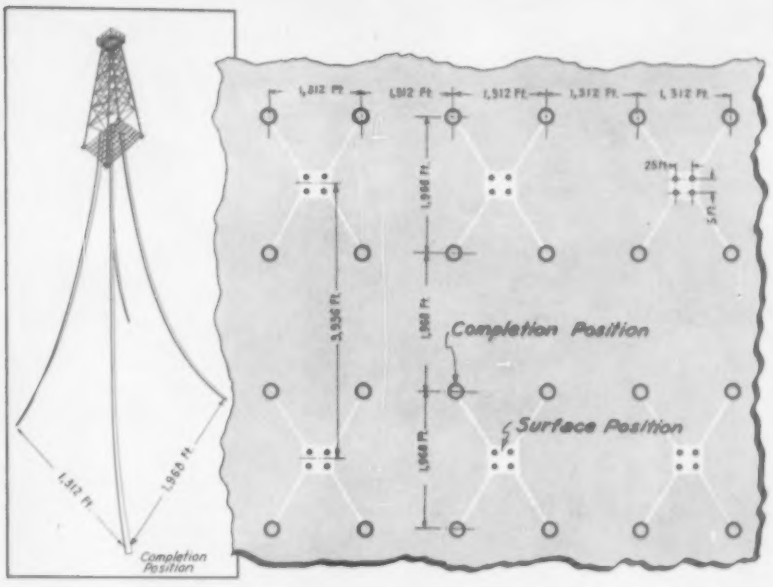
Work will be started after the City Council and the State Lands Commission approve the project. Full-scale operations will not be reached for more than a year.

The water flood marks the beginning of an all-out effort to reduce land subsidence and at the same time to increase oil recoveries.

Injection will be confined almost entirely to the southern periphery, in the Terminal, Ranger, and Tar sands. Pilot floods in these three sands already have shown that flooding will be successful.

Ultimately 1 million barrels of ocean water may be injected daily. Such a large-scale flood would require unitization of city properties with those of oil companies.

Dr. Frank G. Miller, Stanford University professor, suggested the waterflood late in 1955 *(The Oil and Gas Journal, November 28, 1955, page 48)*.



HERE IS THE WAY Russia lays out a hypothetical field for slant drilling four holes from one derrick. Wells are drilled in pairs. They are in even rows, about 5 ft. apart in each two-well series at the surface and 400 to 600 meters (1,312-1,968 ft.) apart at completion depths. The two wells in the left-hand series at each location are completed first. The derrick is then skidded about 25 ft., where the right-hand series is completed.

Russia "Gang" Drills

Soviets use turbodrill for easy-to-make slant holes, two or more to the derrick; results: Four wells in 5 months

THE turbodrill has fired Russian operators with a new enthusiasm for multibore, directional drilling.

Soviet crews using this technique have made 300,000 meters (984,000 ft.) of hole during 1956, according to Neftyanoye Khoziaistov, official organ of the U.S.S.R. Ministry of Oil. This is equal to the official reported footage drilled in Russia by this method from 1950 through 1955.

Key to "cluster" drilling, the publication says, is the simple, speedy way the turbodrill sinks a slant hole without whipstocks or radical changes in technology. Neftyanoye Khoziaistov says it works like this:

"Curvature of the well bore is achieved in the drilling process itself by action of special deflectors on the bit. There are two types of deflectors —those placed directly over the turbodrill in the form of a curved pipe or adapter and those placed in the lower part of the turbodrill near the bit. To a significant degree, the curvature depends on the type of deflector chosen and the way the bit is applied."

Using turbodrills, a single Russian crew works from two to six directional holes at the same time from the same derrick *(The Oil and Gas Journal, August 6, page 72)*.

They apparently cut round-trip time by using one set of drill pipe for two holes. Instead of stacking pipe in the derrick, they pull it from one hole and lower it into another, where the bit is in place and ready to go.

A second look . . . The Russians say the method has proved so successful they are now tapping pools which they had bypassed rather than use "complicated, slow, and expensive" single-hole directional rotary drilling.

Dual-bore drilling is the most common type of multiple-well activity in the U.S.S.R., the official publication reveals, but at least three clusters of wells have been drilled by the triple-bore method in Kuibyshev province. It added that still larger numbers of holes may be worked simultaneously with one rig in fields with several producing zones.

One Soviet study estimates that if the dual-bore cluster technique were used for one-fourth of all Russia's drilling footage during the Sixth Five-Year Plan, which ends in 1960, the nation could make these savings:

. . . At least 500 million rubles ($125,000,000) in capital investment.

. . . An estimated 80,000 metric tons of metal.

. . . "A huge quantity" of other material resources.

The Russians also claim increased rates (per rig) for the technique which they have been working on for 6 years in "many of the Soviet Union's oil regions characterized by the most diverse geological and geographical conditions."

At offshore locations in the Caspian Sea, they claim, commercial cutting speed per crew for dual-bore cluster drilling with one set of drill pipe was 35 per cent higher than the speed for crews working single vertical wells. At nearby inland locations, the margin grew to 37 per cent for holes up to about 4,000 ft.

Rates apparently drop off rapidly after that, however, since the margin skidded to 9 per cent at holes nearing the 6,000-ft. mark. In Kuibyshev province, part of Russia's "Second Baku" region, commercial cutting speed per crew for dual-bore clusters to the Devonian was reported at only 6 to 12 per cent higher than for conventional drilling. In going to the Carboniferous zone, dual-bore cutting scored a 22 per cent margin.

The Russian newspaper said multiple-well drilling is especially advantageous during the long, severe Russian winters when derrick erection and other oil-field construction is most difficult. The Soviet oil ministry said millions of rubles in construction costs were saved in one offshore field alone by using one platform for several wells.

Stumbling blocks . . . Russia admits that large-scale introduction of cluster drilling is being held back by the "unsatisfactory state of operational technique and of underground repair of directional-well clusters."

It adds that, while much of the equipment needed has already been designed, it is being put into production too slowly.

This might explain why over-all results with the program are not expected to make U. S. operators turn green with envy. In outlining a hypothetical case, Neftyanoye Khoziaistvo pointed out that: "Each drilling rig will be busy about 5 months on each cluster platform. Four holes can be completed in this period."

Cuban Test Starts, Others Near

CONSOLIDATED CUBAN PETROLEUM CORP. last week started the first deep test in Las Villas Province under a joint development contract with Cuban Gulf Oil Co.

Signing the contract for the project are, standing from left to right, Carl E. Moore, Consolidated Cuban, and Charles A. Blackford, Simpson Drilling Co. of Cuba; seated from left, W. O. Schock, independent; Dr. Alberto Diaz Masvidal, Consolidated Cuban; and C. J. Simpson, Texas independent.

Cuban Gulf provided a 24,710-acre block for the test, including 19,750 acres in Nafta II-A and 4,960 acres in Santa Clara concessions.

Consolidated Cuban had to start work on an 8,000-ft. test before December 2 to earn an individual 50 per cent working interest in the well and 25,000 acres surrounding it. Simpson will be the driller and will pay half the cost. Schock also has an interest in the well.

Second deal . . . Consolidated Cuban has an option to drill a second 8,000-ft. test on a separate 12,350-acre block in Las Villas Province for Cuban Gulf. Consolidated would also get a 50 per cent undivided interest in this second area. It already has a 2 per cent royalty on Gulf's Las Villas concessions, which total nearly a million acres.

Consolidated Cuban's contract with Gulf followed closely another project in Las Villas, in which the company acquired 7,000 acres in Motembo field. It plans to drill a 6,000-ft. test on the block *(The Oil and Gas Journal, December 3, page 88).*

Peru Opening Offshore Areas

PERU is opening new offshore areas to private oil companies. The move is part of the country's program to build up its crude production by making vast concession acreage available to exploration.

The government said that geophysical surveys have shown oil possibilities on the Continental Shelf. All but a small fraction of the country's 49,000 bbl. daily output currently comes from coastal fields.

Bidding will open December 29. Offers from domestic interests will be accepted the first 60 days, after which foreign firms may bid for 30 days.

Each applicant can bid on 20 exploration and 10 exploitation concessions, whose total area may not exceed 990,000 acres.

Petrolera del Pacifico S.A. is the only company with a concession in the Continental Shelf. It originally had 116,000 acres, but dropped 31,000 acres last year when it converted several areas from exploration to exploitation concessions.

Chile ponders law . . . In neighboring Chile, the president has sent to congress a bill that would permit private companies to receive oil concession on a 50-50 split with the government.

The bill would permit private foreign and domestic companies to obtain concessions in northern Chile. Each applicant could acquire 10 exploration concessions of 125,000 acres. There would be a 50-50 profit split on any production.

Exploration and production in Chile have been the function of the government's Empresa Nacional del Petroleo since 1928. The government has considered opening the country for several years, but there has been strong resistance in the national Congress.

Heletz Rigs Busy

Israel steps up drilling program to boost output

AN intensive development-drilling program is under way aimed at boosting Israel's only producing oil field to an output of 2,800 bbl. daily by February.

Hillel Aldaag, coordinating manager for drilling operation in Heletz field, revealed last week that the two companies operating the field are scouring Israel for additional drilling rigs.

Five rigs are now active in Heletz field owned by the companies. They have contracted for two more from Water Works, Ltd., an Israeli company, and are trying to obtain two more from other companies operating in Israel. Aldaag says they hope to have 10 rigs in the field in the near future.

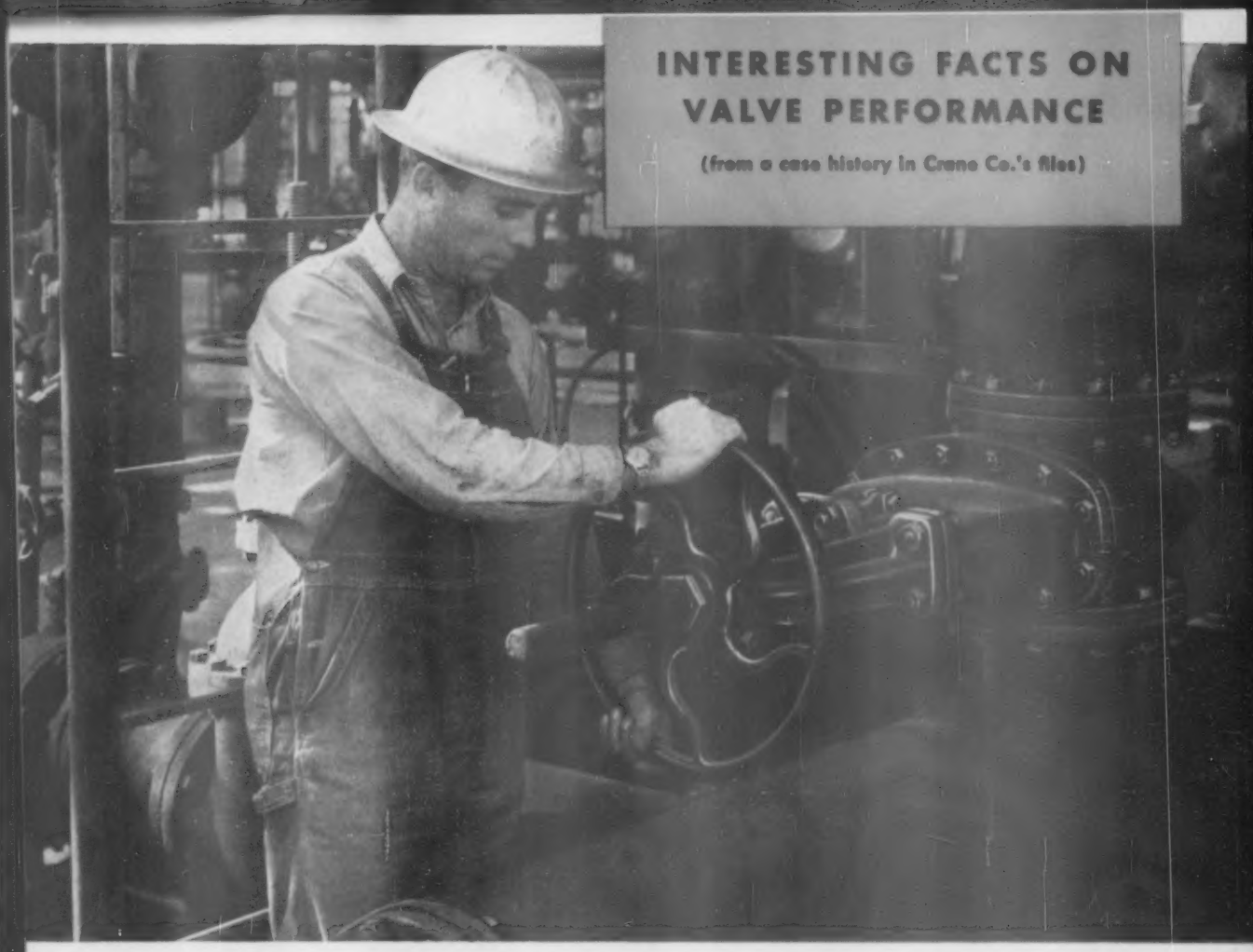
Heletz field was discovered in September 1955 by Israel Oil Prospectors Corp., Ltd., and Lapidoth Israel Petroleum Corp., Ltd. Since that time eight more flowing wells have been drilled, six of them now on production. Three more that have been drilled to the pay zone will be completed as soon as tubing is obtained.

Chokes enlarged . . . Aldaag revealed that the companies have been experimenting with choke sizes on the producing wells.

They now have decided to increase choke sizes to obtain higher per-well production. He said the discovery, completed for 125 bbl. daily on a $\frac{7}{16}$-in. choke, went to 205 bbl. daily on a $\frac{1}{4}$-in. choke and lost only 18 psi. pressure. The companies plan to increase choke sizes on all the remaining wells.

Development of Heletz is being rushed to furnish Israel with more of her own supply. Soviet Russia canceled its contract to ship the country 20 per cent of its oil supply when Egyptian-Israeli hostilities started late in October.

Heletz production is moved from the field by a 5-mile pipeline to railroad and transported by tank car to the Haifa refinery.



INTERESTING FACTS ON VALVE PERFORMANCE

(from a case history in Crane Co.'s files)

No leakage, no sticking with this Crane valve after 2 years on heavy alkylate at 300° F.

THE CASE HISTORY—How do Crane cast steel gate valves hold up on heavy alkylate? The No. 47X 10-inch, 150-pound valve you see above has been in service at Eastern States Petroleum Co. refinery at Houston for over two years.

It handles re-run bottoms from the H_2SO_4 alkylation unit at 300° F. In addition to erosion from solid carbon, there is mild corrosion present from acid. Valve operation is on an average of once every 1½ weeks.

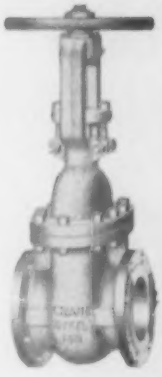
Not once has Eastern States had to put a wrench on this Crane valve. There has been no leakage, no sticking whatsoever. Closure is tight and sure, and response to the handwheel is as smooth and easy as the day the valve was installed.

Unusual performance? Not for Crane cast steel gate valves. For these valves differ from other valves on the *inside*—where performance stands or falls.

Over a century of skill is back of their sound design and pressure-tight castings, and in the heat treating and finishing of the Crane Exelloy seating. That's why Crane valves are *preferred* for refinery service.

Whatever you need in refinery valves—gates, globes, angles and checks—screwed, flanged or welding ends—sizes up to 24 in.—in pressure classes up to 2500 psi.—check with Crane first.

Call your local Crane Representative for valuable help in specifying and ordering, or write to address below.



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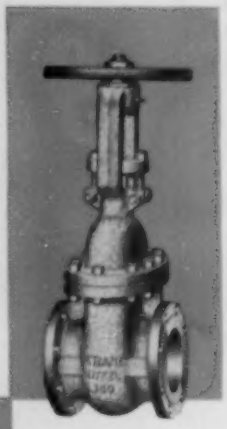
Sizes up to 24 inches in most pressure classes

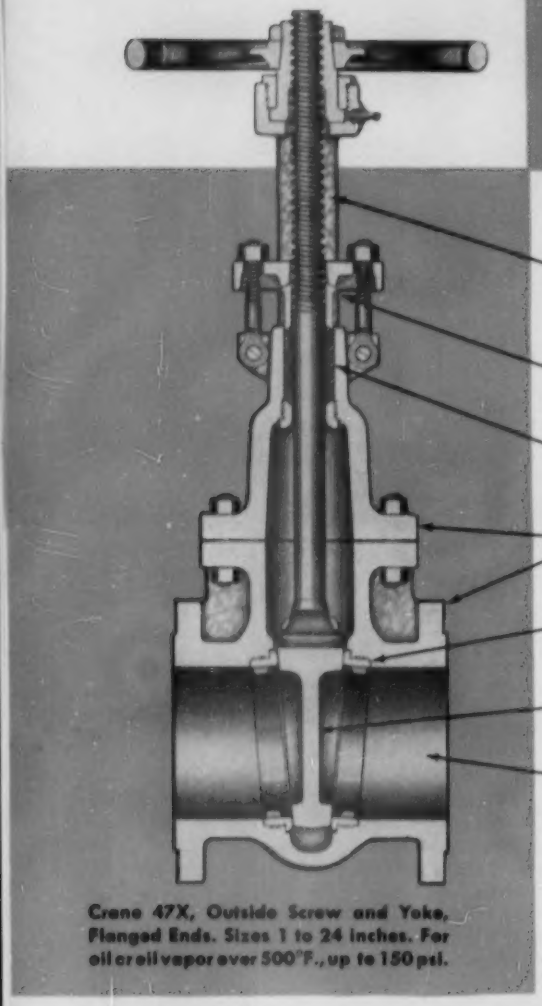


The performance you read about on the preceding page is not unusual with Crane cast steel wedge valves on oil services.

These rugged valves feature quality materials and construction *inside*—where performance counts—provided by Crane to meet the exacting requirements of high-pressure, high-temperature oil services.

Typical is the Crane 47X valve shown here. The Crane Exelloy trim in this valve gives greater strength, greater resistance against wear, tension and shear, and against the corrosive elements encountered in many oil services.

Specify these valves with confidence. Ask your Crane Representative for assistance.



Crane 47X, Outside Screw and Yoke, Flanged Ends. Sizes 1 to 24 inches. For oil or oil vapor over 500°F., up to 150 psi.

- **Exelloy stem** is heat-treated, prevents compression and shear. Ample engagement with yoke sleeve. T-head disc stem connection eliminates lateral strains from reaching stem.
- **Two-piece ball-type gland** with bolted-type gland flange gives even pressure on packing without binding stem.
- **Extra deep stuffing box** assures tightness, provides longer life for packing.
- **Cast steel body and bonnet** are extra rugged, feature heavy-duty metal sections reinforced at all stress points.
- **Exelloy body seat rings** provide long wear-life, resist oxidation or corrosive action.
- **Exelloy disc** withstands wear, resists corrosion. Long, close-fitting disc guides maintain accurate seating, reduce friction.
- **Free-flow ports** permit straight-through flow with minimum turbulence and erosion.

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Spur or bevel gearing can be provided on large size valves to facilitate operation, or for inaccessible installations. MOTOR OPERATION (electric, air or gas) or CYLINDER OPERATION (water, air or oil) also available for large sizes.

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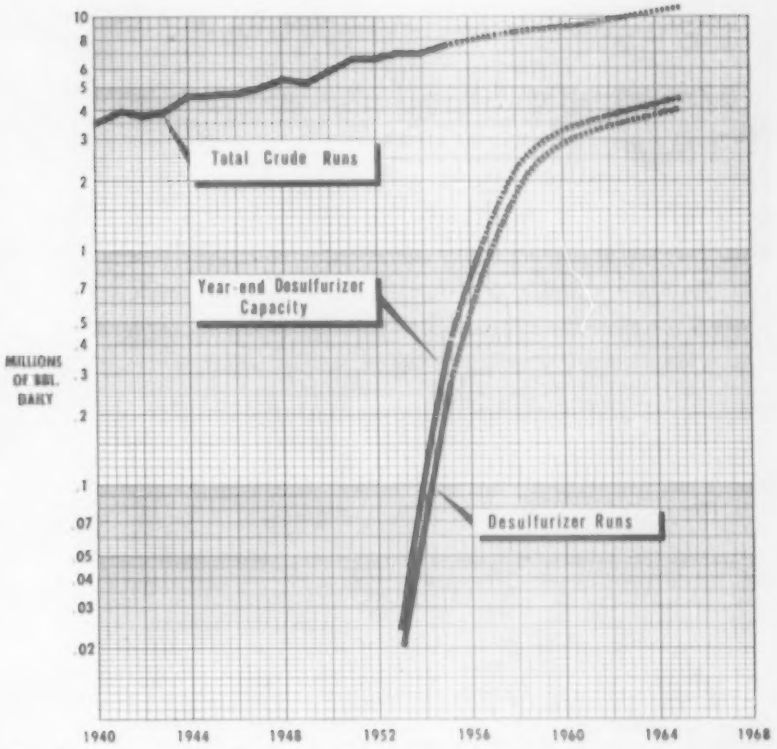
See the Crane 580-page Catalog No. 53 for expert guidance in selecting valves. Specifications, recommendations and sizes on the complete Crane line of valves, fittings, pipe, fabricated piping. Contact your nearby Crane Representative today.

THREE TYPES OF TRIM

Crane regularly supplies Class "X" trim for oil or oil vapor up to 1100°F. max., Class "XR" trim for steam or water up to 850°F. max., and Class "U" trim for steam or water up to 950°F. max.

by James Boyd Smith



ESTIMATED DESULFURIZER CAPACITY and runs for United States refineries, projected to 1965.

1960 — 32%

1965 — 36%

. . . of total refinery runs

That's an educated guess on

What's Ahead for Desulfurizing?

THE process of upgrading various petroleum fractions by hydrogen treating, sometimes called desulfurizing, is becoming increasingly important. Here's an estimate of future desulfurizing capacity.

Results of three different studies show that 32 per cent of total refinery runs may be desulfurized in 1960, and 36 per cent in 1965.

The process . . . Desulfurizing is the selective hydrogen treating of petroleum stocks to remove sulfur, nitrogen, and oxygen compounds and to increase the hydrogen-to-carbon ratio of certain hydrocarbons. Sulfur removal does not actually take place until hydrogen sulfide produced in the hydrogen treating is separated from the product stream.

The process also removes a substantial portion of the heavy metals. It can be applied to a large number of stocks, from solvents which require finishing to heavy residua which are partially converted to lower-boiling fractions by hydrocracking. Volume yields can vary.

Generally, a mixture of hydrogen and the feed to be treated is heated and passed through a fixed bed of a catalyst such as cobalt and molybdenum oxides supported on activated alumina. Usually, temperatures vary between 650° and 850° F. and pressures between 300 and several thousand psi.

Gas may or may not be recycled and, in some cases, serves as a raw material for production of elemental sulfur. Hydrogen for the process is obtained from refinery operations, mostly reforming. Hydrogen consumption can vary from less than 50 cu. ft. per barrel of feed for very mild treatment of relatively good feeds to 3,000 cu. ft. per barrel for severe treatment of residual stocks.

In general, stocks such as reformer feeds or middle distillates will consume from 100 to 300 cu. ft. per barrel and heavy fractions from 500 to 1,000 cu. ft. per barrel. Stocks high in olefins such as catalytic cycle stock or thermal naphtha may require larger amounts.

Uses of desulfurizing . . . At present the treatment of feed stocks for platinum reformers occupies a major portion of desulfurizing capacity. Another large portion of the capacity is used for upgrading distillates and specialty products of various types. For example, cracked or sour heating oils can be improved by desulfurizing to reduce bad odors, sludge formation, and burner deposits.

Diesel oils can be improved as to performance, corrosive properties, and air-pollution characteristics. The prevention of air pollution may become important due to legal restrictions.

Lubricating and other oils or solvent stocks are better when sulfur has been removed and olefins have been saturated, since they have better color, odor, and stability. Another promising use for desulfurizing is in the pretreatment of high-sulfur cracking stocks.

Reducing the sulfur content and increasing the hydrogen-to-carbon ratio improve gasoline yield and reduce coke formation. The gasoline produced will also have higher octane and higher lead susceptibility. Desulfurizing can also be used to treat high-sulfur crude oils. Not only is sulfur removed, but a lighter product, having a greater percentage

THE AUTHOR

James Boyd Smith is a member of the refinery chemicals department of American Cyanamid Co., New York. He received his B.S.E. and M.S.E. degrees in chemical engineering from Princeton University. For several years he was associated as a research chemical engineer with Permutit Co. He joined American Cyanamid as a senior market analyst and conducted several market studies on various aspects of the petroleum industry.

in the more desirable boiling range, is produced.

These examples show what desulfurizing is and what can be done with it. It is largely a supplementary treatment which will upgrade a product, or prepare a stock to produce a better product in a subsequent process. Usually actual final volume of yield from the refinery is not affected.

Current desulfurizing capacities shown in Table 1 are based on various lists of units and published capacities. These capacities, as well as estimates of desulfurizer runs, are shown. Average daily United States crude runs are also shown.

It must be realized that, due to the rapid increase in desulfurizing capacity at present, capacities at any given time are very difficult to determine accurately. Average daily runs to units are even less accurate. However, the figures shown should be correct within a range of a few months.

Forecast Desulfurizing Capacity

Capacity predictions are based on three different estimates: (1) estimates of the proportions of various petroleum fractions that will probably be desulfurized; (2) opinions obtained in a field survey; and (3) limitations imposed by refinery byproduct hydrogen availability.

In order to obtain a first estimate of probable eventual desulfurizer capacity, the following assumptions are made:

1. Sufficient desulfurizing capacity will be installed to treat approximately 75 per cent of platinum reformer feed in 1960 and 80 per cent in 1965. This amount agrees with some field opinions and seems reasonable as to the number of reformers which might be troubled with sour or contaminated feeds.

Platinum reformer runs are forecast at 20 per cent of total crude in 1960 and 22 per cent in 1965. These predictions agree adequately with various published estimates.

2. Sufficient desulfurizing capacity will be installed to desulfurize approximately 45 per cent of distillate fuels and specialties in 1960 and 50 per cent in 1965. This estimate is based on the fact that about half of these fuels reach close to the public where odor, air pollution, etc., are important.

Field opinion is that such fuels will be desulfurized. Specialties and distillate fuels are assumed to be 40 per cent of crude.

3. Sufficient hydrogenation capacity will be installed to treat one-fifth of residua in the 1960-1965 period. In this use the process will compete with coking, visbreaking, and cracking of residua. Residua are assumed to be 15 per cent of crude.

4. Crude runs are expected to be 9,400,000 bbl. per day in 1960 and 11,000,000 bbl. per day in 1965.

Based on the above estimates, projected desulfurizing runs and capacities can be calculated as follows:

Year	U. S. total crude runs (bbl./day)	Total desulfurizer runs — Bbl./day*	Total desulfurizer runs — Per cent of crude runs	Year-end desulfurizer capacity (bbl./day)
1960	9,400,000	3,000,000	32	3,300,000
1965	11,000,000	4,000,000	36	4,500,000

*Calculated from capacity assuming 90 per cent use factor.

Field interviews were conducted. Opinions as to eventual U. S. desulfurizer capacity range from as low as 25 per cent to well over 50 per cent of total capacity. These opinions are in general agreement with the above estimate.

Available hydrogen . . . The estimated desulfurizing figures of 32 per cent of total refinery runs in 1960 and 36 per cent in 1965 can be further checked by a hydrogen balance for the petroleum industry. The hydrogen available from reforming can be balanced against the amount required to operate the above desulfurizing capacity, since it is felt that the manufacture of hydrogen by other means for desulfurizing is not economically justified on any large scale. The following assumptions are made:

1. The percentages of crude going to various uses and processes are as previously described.

2. There will be 600 cu. ft. of hydrogen produced per barrel of reformer feed.

3. There will be 150 million cubic feet of hydrogen per day used for petrochemicals in 1960 and 200 million in 1965.

4. There will be 150 cu. ft. of hydrogen used per barrel of reformer feed desulfurized, 300 cu. ft. for heavier fractions, and 1,000 cu. ft. for residua. These figures are based on literature data.

Calculating a hydrogen balance, the figures in Tables 2 and 3 are obtained.

If the estimated desulfurizing capacity figures are used, the hydrogen balance is quite good.

These three estimates are compatible. Therefore, although the values may be conservative, 32 per cent of total refinery runs in 1960 and 36 per cent in 1965 are forecast for desulfurization. This forecast is illustrated in the graph.

One matter deserves consideration: the large-scale use of gas turbines or free-piston engines in passenger cars. It is not likely that this factor can become important in the 10 years covered by this forecast, but if and when these engines do come, they will be insensitive to octane rating of fuels. Petroleum reforming will become obsolete as Otto cycle piston engines are replaced. Desulfurization units used to treat reformer feed will probably be turned to other uses, but byproduct hydrogen from reformers, which is used for desulfurization, will become less available.

TABLE 1—DESULFURIZING CAPACITY

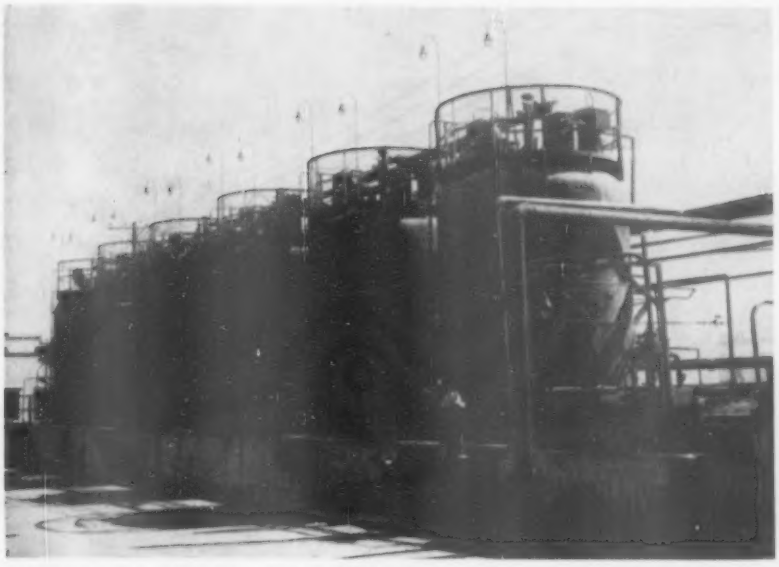
Year	U. S. total crude runs (bbl./day)	Total desulfurizer runs — Bbl./day	Total desulfurizer runs — Per cent of crude runs	Year-end desulfurizer capacity (bbl./day)
1953	7,000,000	20,000	0.3	23,000
1954	6,958,000	75,000	0.7	120,000
1955	7,473,000	275,000	3.8	430,000
1956	8,000,000	600,000	7.7	750,000

TABLE 2—NET HYDROGEN FROM REFINERY OPERATIONS

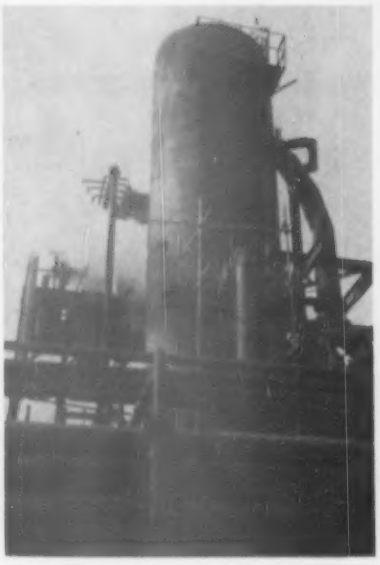
	M.M.c.f. H_2 per day	
	1960	1965
Total hydrogen from reformers	1,130	1,450
Less hydrogen to petrochem.	150	200
Net available for desulfurizing	980	1,250

TABLE 3—HYDROGEN USED FOR DESULFURIZING

	M.M.c.f. H_2 per day	
	1960	1965
Reformer feed	190	260
Specialties and mid. distillates	460	600
Heavy residua	250	300
Total required for desulfurizing	900	1,160



BATTERY OF CRUDE-OIL TREATERS at Eastern States Petroleum refinery in Houston.



GAS OIL from vacuum tower is charged to treater.

Vacuum-Tower Overhead Gets a Cleaning

Water removal via electrical precipitation at Eastern States makes possible increased stripping-steam rate and ups output of virgin gas oil off unit

by Larry Reson
District Editor

AN out-of-service distillate treater adapted to handle vacuum-unit overhead has improved an increased virgin gas-oil charge for the catalytic cracking unit at Eastern States Petroleum Co., Inc.'s Houston plant. The treater allows heavier steam stripping on the vacuum unit.

The unit also has made it possible to avoid emergency shutdowns due to condenser leaks. Within limits, it can remove water and salt entering the unit when brakish cooling water leaks into the system.

Houston Ship Channel water is used on a once-through basis and has a high salt content. However, an initial small leak in overhead condensers can be now tolerated for some time. Before, it meant an immediate shutdown to avoid contaminants from reaching the catalyst in the cracking unit.

Desalting Operation

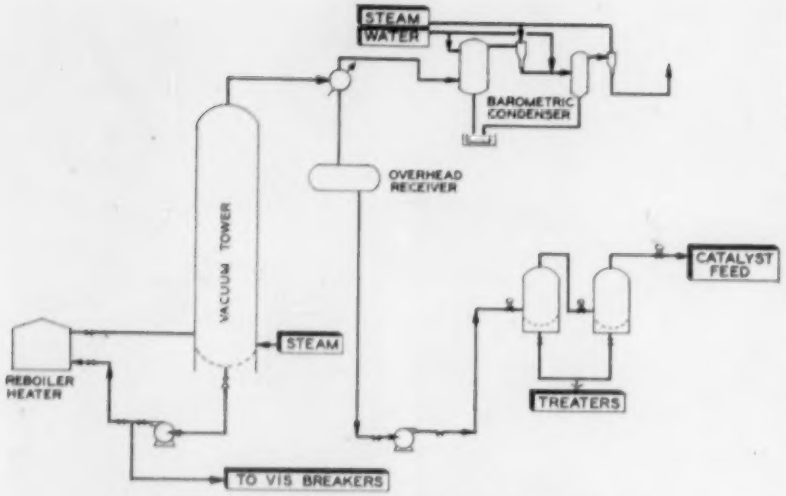
Desalters are handling about 30,000 bbl. of incoming crude at the plant and 20,000 bbl. is processed directly without undergoing a pass through desalting equipment. Depending upon the type of crude run, this situation posed a definite downstream problem. Heavy topped crude charged to the vacuum unit sometimes has a relatively high salt concentration, so it was possible for some of the salt to be carried overhead and come in contact with the cracking catalyst.

What to do . . . An 8,000-bbl. per day treater had been inactivated and placed on a standby basis. Its particular location plus its size made it impractical to use in conjunction with the main crude desalters. However, its size was ideal for handling the vacuum overhead. Hence, the decision was made to use it for removal of salt which might be carried over in the gas-oil stream.

When placed into this service, the treater operated to remove practically 100 per cent of salt being carried overhead. With the wide variety of crudes being charged, salt was carried over about 4 out of 10 days and the concentration ranged from nil to 8 lb. per bbl., depending upon the type of crude (Table 2).

After the treater had been tied in, it was decided to increase the vacuum overhead cut by upping the stripping steam rate. A maximum of 0.3 per cent water was permissible in the gas-oil feed to the catalytic cracker. With this as a criteria, the stripping steam rate was held to 200-300 lb. per hour. Any increase in this rate resulted in entrainment of water vapor greater than prescribed.

The steam rate now averages 1,200-1,300 lb. per hour. Water vapor carried over amounts to as much as 1 per cent. However, after the gas oil passes through the treater, water content drops below tolerable limits (Table 2). Hence, it is now possible to dig deeper into the topped crude and increase virgin gas-oil charge. Table 1 shows average gas-oil overhead to be 5,340 bbl.; considerably higher than the 4,500 bbl. previously obtained. This greater overhead also reduces the load on the visbreaker, which receives vacuum-tower bottoms. Effect of a high steam rate may be seen in Table 3. With high steam stripping, gravity of tower overhead dropped from an average 28.2 to 25.9. Initial boiling point



VACUUM-TOWER OPERATIONS at the Eastern States refinery.

TABLE 1—TYPICAL FLOW RATES FROM VACUUM TOWER, ON 7 SUCCESSIVE DAYS (BARRELS PER DAY)

Vacuum tower bottoms	13,938	16,900	15,900	16,100	10,735	16,700	14,900
Vacuum tower overhead	5,400	4,950	5,130	5,220	5,490	5,580	5,580

TABLE 2—VACUUM TOWER OVERHEAD ANALYSIS TAKEN EACH SHIFT

	Upstream of desalter			Downstream of desalter		
A. Salt, lb. per bbl.	Nil	Nil	Nil	Nil	Nil	Nil
Water, per cent	0.8	0.4	0.5	0.1	0.2	0.1
B. Salt, lb. per bbl.	8	6.4	6.4	Nil	Nil	Nil
Water, per cent	1	0.9	0.8	0.1	0.15	0.1
C. Salt, lb. per bbl.	Nil	Nil	Nil	Nil	Nil	Nil
Water, per cent	0.5	0.55	0.35	0.1	0.1	0.1
D. Salt, lb. per bbl.	4.8	4	Nil	Nil	Nil	Nil
Water, per cent	0.35	0.5	0.6	0.1	0.2	0.2
E. Salt, lb. per bbl.	10	8	Nil	Nil	Nil	Nil
Water, per cent	0.5	0.4	0.6	0.2	0.1	0.2

TABLE 3—CHARACTERISTICS OF VACUUM-TOWER OUTPUT AT VARYING STEAM RATES

	Overhead	Bottoms		A.S.T.M. distillation of overhead		
Steam rate—	A.P.I.	A.P.I.	I.b.p	10 per cent	50 per cent	End point
High	26.6	10.1	413	542	718	76 per cent at 760° F.
High	25.2	9.5	425	563	735	65 per cent at 760° F.
Low	28.4	10.9	381	534	697	77 per cent at 760° F.
Low	28.0	10.3	375	533	707	76 per cent at 760° F.

averaged 419 for the high rate and 377 for the lower rate, while end point averaged 70 and 76½ per cent, respectively, at 760° F.

In operating the treater under these conditions, only electrical precipitation is used to separate the brackish water and entrained steam condensate from the gas oil. The unit is operated at about 130° F. No water is added because of the large amount of carryover with the high steam rate. This is sufficient to dissolve the salt, and the precipitators remove the resulting salt solution.

Acknowledgments

Cooperation of the management of Eastern States Petroleum Co., Inc., in release of this information and the assistance of Hugh Edwards, plant superintendent and C. E. McDaniel, assistant superintendent, Plant No. 1, is gratefully acknowledged.

ELEMENTS OF FIELD

Control of

CONTROL of expansion type of low-temperature separation systems represents a special problem, particularly where hydrates are encountered. Unfortunately no one satisfactory method of control is applicable for all systems due to variations in pressure, fluid properties, and the system used.

Two typical low-temperature systems are shown in Figs. 1 and 2. Both represent the type of system where hydrates are allowed to form and then melted. Fig. 1 is typical of that system for high-pressure, high-temperature making salt water while Fig. 2 is primarily for small wells, making no salt water, which do not justify a high equipment investment. The two systems shown represent extremes with many variations in between.

Preventing hydrates . . . The problem in all cases is to prevent hydrate formation prior to the choke and yet supply enough heat to melt the hydrates formed when the gas expands across the choke. Wherever possible it is desirable to furnish this heat from the well stream without lowering the temperature below the hydrate point. The following general variations are encountered:

1. The well stream is too cool and a heater is used to prevent hydrate formation in the flow lines and supply heat for the separator coil. (Fig. 2).

2. A low-pressure steam generator is used to supply heat to the separator coil, the well stream flowing directly to the choke.

3. Heat for the separator coil is furnished from the well stream as shown in Fig. 1.

The gas-gas heat enchanger is added for Method 3 above when the well stream contains a surplus of heat. This is normally encountered on production from deep horizons as typified by Gulf Coast operations.

The free-water knockout is an essential item in the large majority of wells for even relatively small amounts of free water in the flow lines and around the choke are a potential source of trouble. There have been some applications, however, particularly in Oklahoma and Kansas, where salt water has been no trouble.

Using well stream . . . The system shown in Fig. 1 is a simple yet effi-

Low-Temperature Systems

by
Dr. John M. Campbell
University of Oklahoma

cient means of control. In most systems it is desirable to carry the gas temperature entering the choke at about 5° to 6° F. above the hydrate temperature. The only means of positively controlling this temperature is by either (1) bypassing the heat exchanger or (2) bypassing the separator coil, either of which will raise the gas temperature. Either approach is possible but the former is the more sensitive. In any event a bypass around the coil should be provided in the event of malfunction or should the coil freeze.

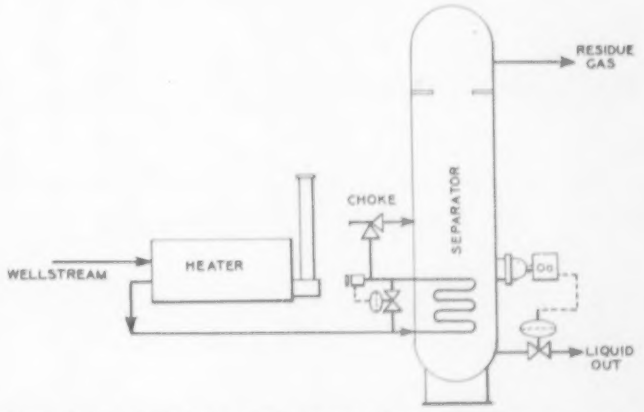
Inasmuch as the desired gas temperature is usually close to the hydrate point, accurate control is necessary. Variations in flow rate, atmospheric temperature, etc., will all affect this temperature. Consequently, proportional control plus reset is advisable, for without reset the desired temperature will drift. Most manufacturers of this equipment furnish only thermostatic control for competitive reasons. The author has often noted, however, that where trouble is encountered for this reason the pumper simply raises the control temperature to where the normal drift causes no trouble. This is indeed an expensive way to save money on control equipment.

A two-way valve located on the gas bypass could be used instead of the three-way valve shown if the pressure drop across the heat exchanger is high enough so that the valve may operate properly. This results in a cost reduction but once again the control is not quite so positive. If a three-way valve is used it should be on the outlet rather than the inlet side of the heat exchanger.

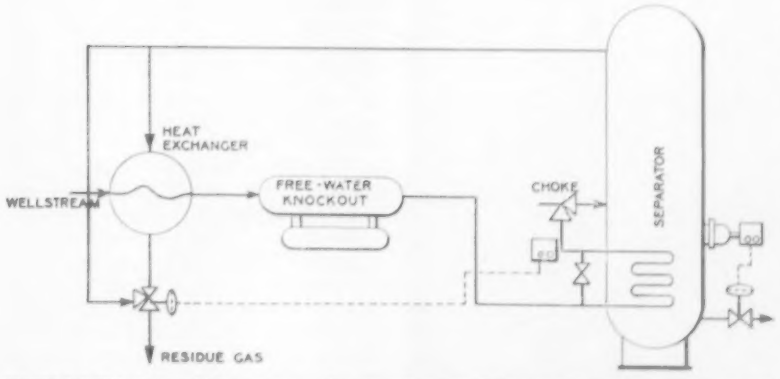
The level controls on the free-water knockout and separator have been discussed in Parts 17 and 20 *(The Oil and Gas Journal, July 22 and October 29, 1956)* and the system's pressure control in Part 18 *(August 13, 1956)*.

Use of heater . . . The simpler system shown in Fig. 2 has correspondingly simpler controls. The temperature of the gas to the coil is set by the thermostats in the water bath of the indirect heater. The control on the separator-coil bypass is not essential but is a desirable addition. The heater control is "rough" and there are periodic changes in the coil heat demands. This bypass therefore supplies the needed flexibility.

The thermostat is normally set so that the bypass valve is fully open when the gas leaves the coil about 5° to 6° F. above the hydrate point. The heater is then adjusted so that the fluid leaving the separator is not more than 80° F. with the bypass valve fully closed. In this manner the bypass is normally closed during operation and the thermostat serves primarily as a safety control.



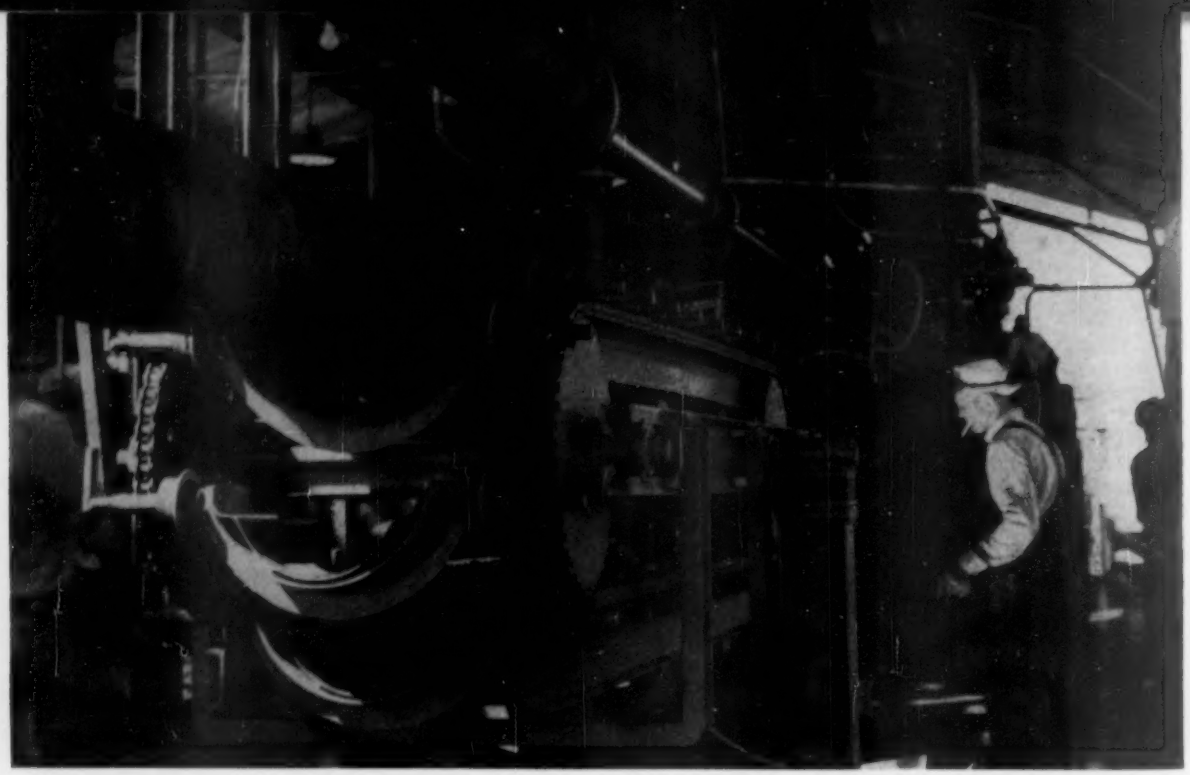
COOL WELL STREAM is passed through heater, then through separator coil. Heat removed in the coil melts hydrates formed by gas expansion across choke. Coil bypass prevents too low gas temperature. Fig. 2.



SURPLUS HEAT in a high-pressure well stream is removed by the gas-gas heat exchanger and the separator coil. Here control of the gas temperature to prevent hydrate formation at the choke is by bypassing the exchanger. Fig. 1.

An alternate control is provided by placing the thermostatic element in the body of the separator near the liquid outlet. The bypass is then used to control the liquid temperature. Since this desired temperature is nearly coincident with the usual hydrate conditions encountered, it automatically provides for a gas temperature high enough to prevent freezing. This method prevents too high a heater temperature from giving excessive reentrainment in the separator, but is inherently less sensitive.

The level control is standard and the same as that normally specified in Fig. 1.

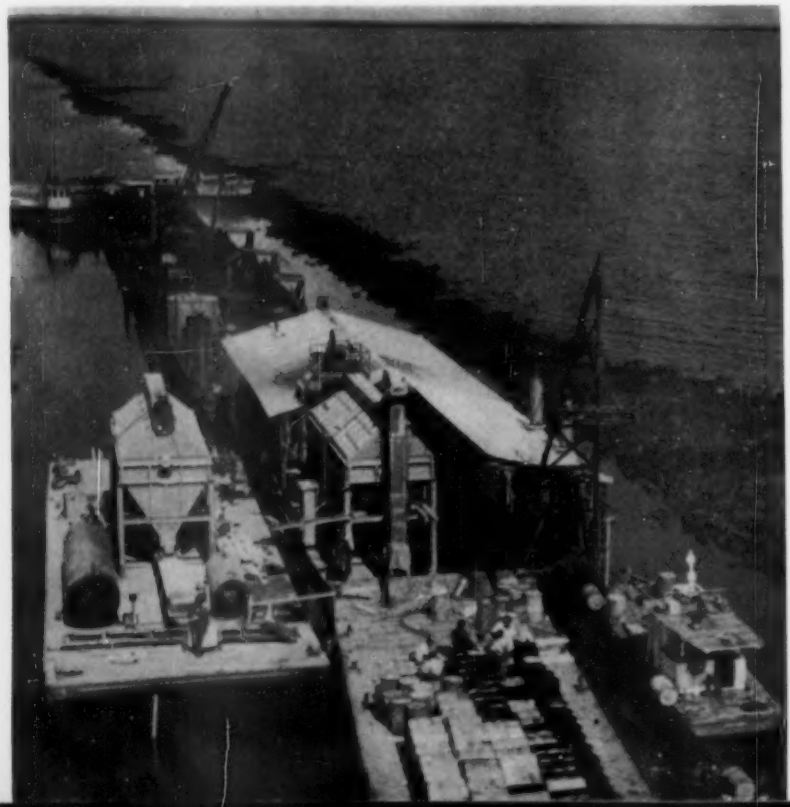


Greater negative buoyancy obtained, corrosion defied, in process whereby . . .

Weight Coating Applied by Extrusion

High-density coating put on pipe by specially developed equipment installed on lay barge in Louisiana marshes

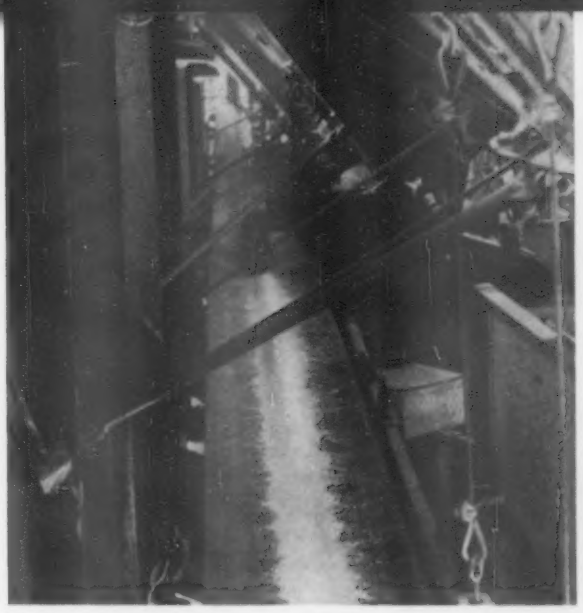
by Larry Resen
Gulf Coast District Editor



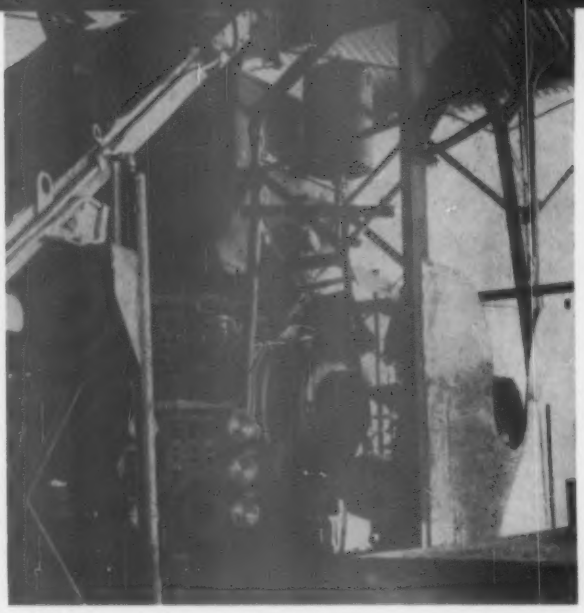
APPLICATION of a rubberized asphalt mastic weight coating via an extrusion process was used by Brown & Root, Inc., in coating about 28 miles of pipe for Southern Natural Gas Co. in salt marshes near Lafitte, La. *(The Oil and Gas Journal, November 19, page 140.)*

The high-density coating, fortified with barite aggregate, serves to both weight the pipe down and protect it from corrosion in its underwater location. The "Timcoat" application provides its own bond directly to bare pipe, and affords a flexible, nonchip coating with high dielectric strength. It was developed by Gen. P. H. Timothy, formerly with the U. S. Corps of Engineers *(The Oil and Gas Journal, January 2, page 70).*

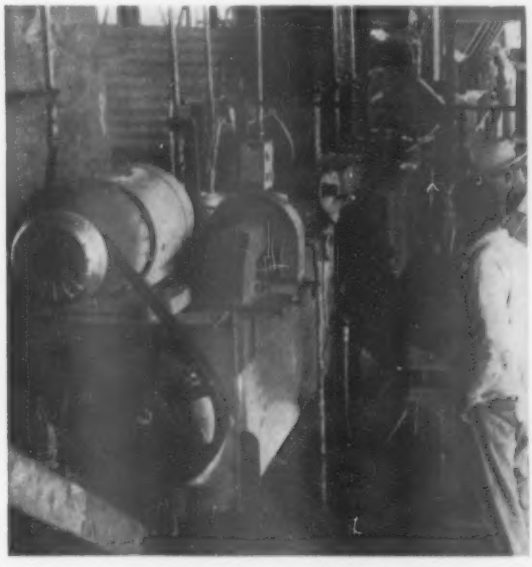
Specially designed equipment was constructed by Brown & Root and installed on a lay barge for marine pipeline construction. The equipment also includes hopper barges for shuttling



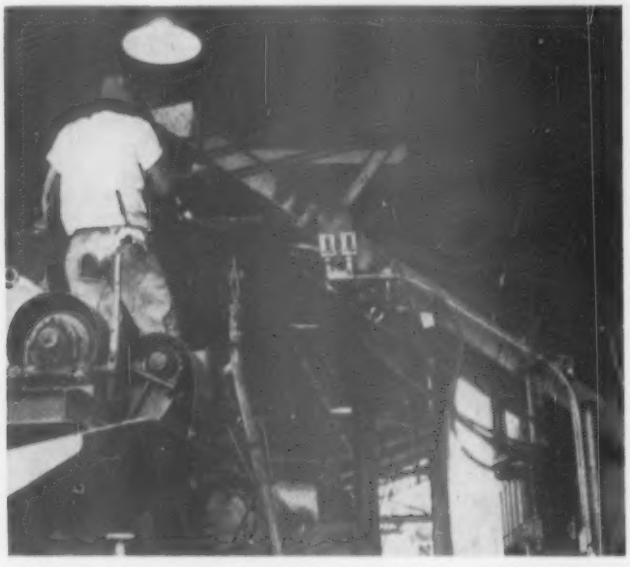
1 Hoppers discharge dry-mix ingredients onto conveyor belt which carries them into dry-mix unit on hopper barge and then to shuttle barge for trip to spread.



2 Extrusion nozzle is in center with glass-wrapping machine around it. At left center is vibrator for compacting mix around pipe. Conveyor belt, upper left, feeds into machine hoppers.



3 Storage hoppers, metering hopper in background are on lay barge. In center are first four sections of hot-mix machine. In foreground is glass cutter, fifth section of hot-mix machine.



4 Insulated and jacketed feed hopper at left stores supply of finished mix which is fed into Timcoat machine hoppers by conveyor belt at right.

dry mix to the lay barge and a centrally moored hopper and dry-mix barge. Clarence Shaw was project supervisor in the building of this specialty equipment.

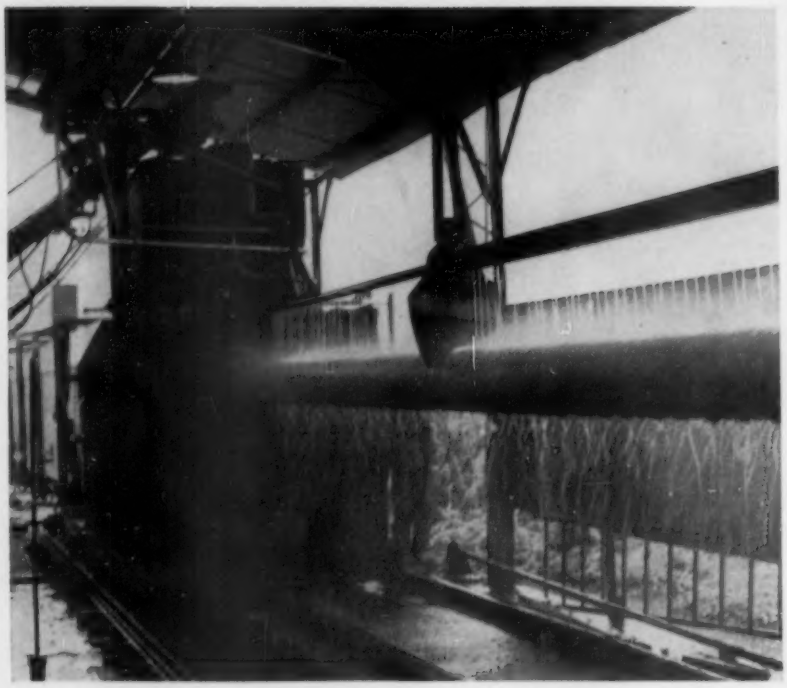
The coating . . . The special asphalt coating consists basically of emulsified asphalt, barite aggregate, synthetic rubber, glass fibers, and a filler medium for gaining the desired density. Three basic mixes are used to get any required density of mix. They break down in a heavy weight—about 230 lb. per cu. ft.; a medium weight—208 lb. per cu. ft.; and a light weight—136 lb. per cu. ft. The basic mixes can be varied to meet any desired specification.

Barite aggregate is common to all mixes. In addition to the barite, the heavy weight uses drilling mud as a filler to fill in the voids in the aggregate and thereby gain the desired density. The heaviest density possible using this combination—230 lb. per cu. ft.—compares with the heaviest density obtainable with concrete coatings—190 lb. per cu. ft. The medium weight substitutes a limestone filler in place of the drilling mud. Finally, the lightweight mix uses a limestone-sand filler.

Hopper barge . . . To facilitate transportation of material, a main hopper barge was constructed for preparing the dry mix prior to its being moved to the lay barge. This hopper barge can be moored at any convenient location, accessible both to supply points and the individual spread location.

This barge includes three medium hoppers and one large hopper—all box type—and a small conically shaped additive hopper. Conveyor systems are used to handle the dry components. A belt conveyor carries the dry ingredients to a bucket conveyor at the extreme end of the hopper train.

This bucket conveyor lifts the ingredients to an overhead screw con-



5 **Water sprays cool pipe after it has been coated and before it is lowered into water. Overhead telescoping boom is used for lowering in.**

veyor. The screw conveyor moves the ingredients to the gates leading to individual hoppers. These feed gates are opened or closed as necessary to provide segregation of individual components into the various hoppers. The additive hopper is filled individually.

A conveyor belt runs along beneath the hoppers which have truncated legs through which a small amount of the ingredients may be dropped onto the conveyor belt. The ingredients are measured out onto the belt through meters so that the mix will be made up in the proper proportions. In practice, the fine ingredients are dumped out of the first hopper in the train and onto the belt where they are covered by heavier components from hoppers further down in the train. In this way losses of fine particles are held to a minimum.

The additive hopper is the last to feed onto the conveyor belt, after which the components pass through a dry-mix machine from where they are deposited onto another conveyor system to be carried to an overhead screw conveyor on the shuttle barge. The shuttle barge is simply to move the dry mix to the lay barge and consists of four slim hoppers loaded by the overhead screw conveyor. A belt conveyor is located beneath the hoppers for unloading.

Powdered asphalt . . . The additive hopper is used primarily to measure the synthetic rubber component added to the mix. However, there is one other component added here, which is dry powdered asphalt. This is not to be confused with the liquid asphalt emulsion added at the lay barge. The powdered asphalt is added to control the penetration of the final asphalt in the blend.

It has been determined from long-time records compiled by Timothy that the temperature in coastal Gulf of Mexico and Mississippi River waters will range from 59-80° F. The coating is designed for stability under these conditions. It was determined from experiments that the emulsified asphalt alone would result in a final coating with a penetration rating of about 60. This is too soft and a reading of 25-30 is felt to be much more desirable.

Hence, the powdered asphalt, which has a penetration from 0-3, is used as an additive to achieve the desired end result. The rubber content, meanwhile, is also varied to achieve the desired ductility in the coating at these locations. Timothy emphasizes that the mix is set up for this locale and would naturally have to be varied depending on the pipeline location.

The power drives on the conveyor systems are electric motors and power here is supplied by two GMC 671, 60-kw. diesel-generator sets.

Lay barge . . . The storage hoppers on the lay barge are similar to those on the shuttle barge. Four slim hoppers are filled via a conveyor system. They, in turn, dump onto a conveyor belt located directly beneath the hopper dump chutes. The conveyor belt then feeds a bucket conveyor which lifts the dry mix up and dumps it into a metering hopper.

This hopper is equipped with a vane type of meter at its outlet and feeds the dry mix at a desired rate into a mixing chamber. This mixing chamber is the entrance to the hot-mix machine. A short screw conveyor moves the dry mix and mixes it with the hot emulsified asphalt which is added at this juncture. The wet mix is next carried into a heater section. Here the mixing continues and the asphalt mix is increased to a temperature of about 260° F.

The hot-mix machine is divided into five sections, four of which are immediately in line with each other. Just prior to the fifth section, however, a glass cutter is installed, and glass fibers, fed from a spool are cut into short lengths and added to the mix, which then passes into the fifth and final section of the hot-mix machine.

An interesting facet of the glass-fiber addition is that efforts to add it earlier in the process resulted in its losing its effectiveness. The thin fibers were subjected to both temperature and the agitation of the mix through all five sections. This combination of factors and the 4-minute run through the hot-mix machine was apparently too severe. However, the short time spent in the fifth section has no effect on the fibers.

The fifth section of the hot-mix machine dumps onto another belt conveyor which carries the hot asphalt mix upward and dumps it into the main feed hopper on the lay barge. This hopper feeds the Timcoat machine at the beginning of each run. The main feed hopper, plus two hoppers on the machine itself, are all heavily insulated and oil-jacketed. Heated oil is circulated around the hoppers to maintain the temperature of the mix.

All of the equipment described, from the storage hoppers at the end of the barge to the main feed hoppers, are all located on one lengthwise half of the lay barge. Also located on this side are two Murphy Diesel Co. 120, 100-kw. diesel-generator power plants. Electric motors are used profusely in the conveyor and mixing systems and for driving the coating machine.

The asphalt mix at 260° F. is a sticky mass which does not ooze, hence, it is handled as a solid material. This temperature was selected as one at which all of the volatiles will have condensed and there will be no entrained pockets in the extruded coating under this condition.

Extrusion machine . . . The Timcoat machine rides on rails laid the length

of the lay barge. It has two feed hoppers which are filled from a conveyor belt carrying asphalt mix from the main feed storage hopper.

These feed hoppers dump into the extrusion feed system, and their output is controlled by hydraulically operated slide valves. The extrusion feed system is a dual system, one part located on either side of the machine. Each includes a short feed hopper and a small screw conveyor fed by the hopper. By keeping the hoppers filled, and isolated from the upper feed hopper, a constant head of material is maintained on the feed screw conveyor, thereby insuring a constant feed rate to the extrusion head or nozzle.

The two feed conveyors carry the asphalt mix into the extrusion nozzle, which is similar to a large swage nipple. The feed enters the large end of the nozzle and is distributed around the pipe. As the pipe moves through the machine the asphalt is compacted about it to the circumference of the extrusion nozzle. This will vary according to the size of the pipe and weight of coating desired.

The front end of the machine is spring mounted and during coating operations, electric vibrators work to compact the asphalt around the pipe in the nozzle. Three possible methods were explored to achieve this compaction. Direct pressure and an impact method were discarded in favor of the vibratory route which works exceptionally well. Once the asphalt-coated pipe emerges from the extrusion head, it is immediately wrapped with glass fiber and then subjected to a water spray. This serves to cool the pipe prior to its being lowered into the water.

The water spray consists of telescoping sections of perforated pipe. They range from 2-in. pipe nearest the machine through 4, 6, and 8-in. diameter pipe at the far end. Each telescoping section is supported by hangers riding on rollers along an overhead rail. As the machine starts to coat the pipe, the spray boom is completely telescoped. The hangers walk back with the machine, and as more and more of the pipe is coated, then more of the boom is expanded and more of the line is sprayed.

In this manner the spray acts in synchronization with the coating unit. The best method of spraying is to force the water up through overhead perforations, to impinge against an inverted angle iron and then to spray outward and downward around the pipe below the spray boom. However, this method is used only on the largest section of the spray boom. The telescoping feature precludes the use of overhead holes and angle iron baffle on the other sections.

"The coating is tough and flexible and will not crack or chip when the pipe bends as it goes off the end of the lay barge. This feature will be all the more important when laying pipe in deep water. Electrical resistance of the coating is 13 times better than concrete and its dissipation factor is four times better than coal tar."

Coating cycle . . . The initial step in coating a line is to insure that the beginning of the asphalt coat is compact and flush with the line. To achieve this a split ring is tack welded to the line whenever the machine starts to coat a new section of pipeline. This would be the case, for instance, where a field joint was to be made at a compressor station or a tie-in to an existing line.

The split ring would be tack welded about a foot or so back from the end of the pipe. Then the machine would begin to start coating from the ring and this would provide a solid support. The ring would later be removed and the field joint completed. The machine would go on, however, to continuously coat the line until the next field joint required the use of the split rings.

The repetitive coating cycle takes place as the coating machine rides along the pipeline. At the beginning of a cycle, the machine is at the extreme end of its travel near the laying end of the lay barge. Its feed hoppers are full, and behind it extends the bare pipeline, previously welded and wire brushed. The machine is started and the electric motor drive walks the machine backward through its pinion gear and rack. The rack is located between the two rails on the deck of the barge. The electric motor receives its power supply from elevated wires along which run trolley connectors.

As the machine moves backwards the feed conveyors discharge into the emulsion nozzle, the vibrators compact the asphalt, and the coated pipe emerges from the nozzle to be immediately wrapped with fiber glass. Water sprays the newly coated section of pipe from the overhead telescoping boom. The entire operation proceeds at a rate of about 15-20 ft. per minute. When the machine completes its travel at the far end of the barge, it is directly beneath the conveyor belt which carries fresh feed from the main storage feed hoppers and refills the hoppers on the machine.

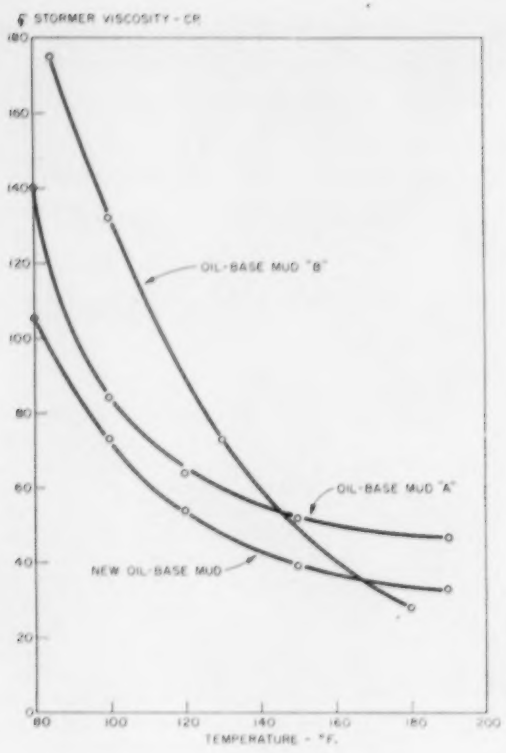
A clamp behind the machine is next applied to the bare pipe. A tugboat moves the barge train forward and the coated pipe pays out from the laying end of the lay barge. As the pipe moves across the lay barge it walks the coating machine forward. Once the machine reaches the stops at the laying end of the barge, the tug stops the barge movement. The clamp is released from about the pipe and the coating cycle begins again.

On the Southern Natural job, the pipe was conventionally welded and X-rayed on three barges and moved to the coating machine on a fourth barge. Just prior to being wire brushed, the pipe was heated by means of oil burners. This prepared the surface so as to improve the bond between the bare metal and asphalt. At a later date, an induction heater will probably be installed as an integral part of the machine, eliminating the oil burners. It is only necessary to heat the surface of the pipe slightly and an induction heater should work quite well.

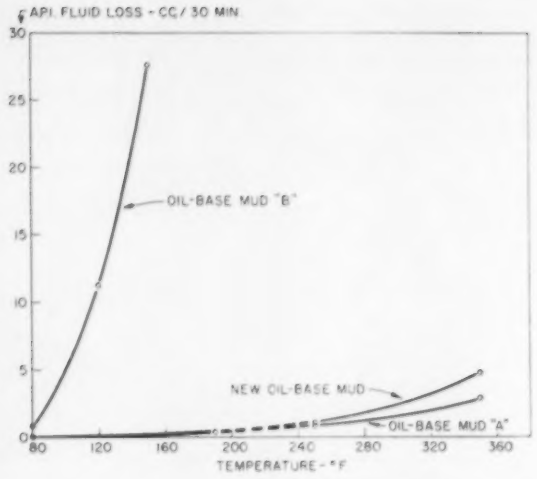
Effectiveness . . . In pointing out the benefits of the asphalt coating, Ed Minor, Brown & Root vice president, noted that the direct bond with the bare pipe is so good that no primer is necessary. It was originally felt that one should be used, but none was found which improved the bonding effectiveness. He said the coating is absolutely waterproof and tests have shown it to be 5-15 times more effective against corrosion than the thickest coal tar coating used heretofore. Test lengths submerged off Louisiana and in Lake Maracaibo have shown the coating so far to be immune to marine organisms which attack concrete and require concrete pipe to be buried.

The coating is tough and flexible and will not crack or chip when the pipe bends as it goes off the end of the lay barge. This feature will be all the more important when laying pipe in deep water. Electrical resistance of the coating is 13 times better than concrete and its dissipation factor is four times better than coal tar.

The Southern Natural project consisted of 3,800 ft. of 8-in. and approximately 27 miles of 12-in. line from Lake Enfermer field to a junction with Southern Natural's existing line in Barataria Bay, near Lafitte, La. On the 12-in. line the pipe has a ⅝-in. wall thickness and the coating is 1 in. thick, using the barite mix. The 8-in. pipe is coated with 1½ in. using less-expensive but lighter aggregate.



STABLE VISCOSITY of the new mud is shown by minimum change with temperature. Mud B was made with crude oil similar to that used in the new mud. Fig. 1.



LOW FLUID LOSS of the new mud is maintained over a wide temperature range. It compares favorably with mud A. Fig. 2.

New Mud Scores on Four Counts

This new oil-base mud can be economically mixed with rig equipment using either crude or refined oil. It has improved high-temperature stability, contamination resistance, and weight-suspending properties and can be used as drilling fluid, perforating fluid, packer fluid, or behind-casing fluid.

by J. L. Lummus
and
B. V. Randall

RESULTS of laboratory and field tests on new oil-base and invert-emulsion muds show:

- **Easy mixing . . .** The oil-base mud can be easily prepared at a well location with conventional rig-mixing equipment by adding a dry concentrate to locally available crude or refined oils.

- **High-temperature stability . . .** The oil-base mud has satisfactory properties for use in wells having bottom-hole temperatures as high as 350° F.

- **Good resistance to contamination . . .** Addition of small amounts of treating additives (peptizer and calcium chloride) stabilizes the mud against the effects of water and shale contamination.

- **Versatility . . .** The concentrate can also be used to compound a water-in-oil emulsion or the oil-base mud can be converted to a water-in-oil emulsion mud.

Authors are with Stanolind Oil & Gas Co. research laboratories, Tulsa. Paper presented at 1956 A.A.O.D.C. meeting, Fort Worth.

Uses of Oil-Base Muds

Oil-base muds are primarily used for drilling and completing water-sensitive producing formations and for obtaining "native-state" cores for reservoir-evaluation tests. On several occasions, oil-base muds have been successfully used in deep wells under temperature conditions which normally cause conventional water-base muds to solidify. Specially treated oil-base muds have found use as packer fluids, gun-perforating fluids, and for placement behind casing as a protection against corrosive waters.

Much has been published on oil-base muds and, as a result, the industry is well aware of the advantages of oil-base muds as completion fluids. Production data on wells completed with oil-base mud as compared to water-base mud completions have been particularly impressive.[1] In spite of proven advantages, oil-base muds have not been widely used in areas other than the West Coast because of high mate-

rial, transportation, and storage costs and, in some instances, inability to tolerate water contamination.

Some of these disadvantages have been overcome by the development of water-in-oil emulsion muds,[2,3] which have similar properties to oil-base muds. The main advantage of water-in-oil emulsion muds, which are often referred to as invert emulsions by many mud technologists, is that they are not adversely affected by water and shale contamination, and as a result such compositions have been successfully used as both drilling and completion fluids. Oil-base muds, however, are still considered superior to water-in-oil emulsion muds for obtaining native-state cores and for various high-temperature applications.

The New Mud

Composition . . . The composition of this improved oil-base mud is shown in Table 1. The dry concentrate is packaged in 100-lb. bags and consists of a mixture of clay, a partially polymerized organic material, a base, and a catalyst. When dispersed in an oil, the agents react to provide a gel quality or "body" to the hydrocarbon base.

Treatment with caustic soda, calcium chloride, and peptizer A may be desirable for proper compounding of the oil-base mud. The function of the caustic soda is to adjust the properties of the oil-base drilling fluid to compensate for differences in the characteristics of base oils. Peptizer A and calcium chloride are added to protect the oil-base mud against water and solids contamination which may occur during displacement.

Preparation . . . Pilot tests are usually conducted prior to mixing the quantity of mud required for a particular job in order to select the most suitable base oil and to determine the amount of concentrate and treating agents necessary to produce an oil-base mud with desirable properties.

TABLE 1—Composition of Oil-Base Mud (42-gal. bbl.)

Ingredients:	
40 gal. field crude oil or refined oil (18°-32° A.P.I. gravity)	
40 to 50 lb. dry concentrate*	
Treating agents:	
0 to 1 lb. caustic soda	
0.2-2 lb. calcium chloride	
0.1-1 lb. peptizer A*	

*The dry concentrate and peptizer A are manufactured and distributed by the Baroid Division, National Lead Co., under the trade names of "Driloil" and "Driltreat," respectively. Applications of patents pending.

The base oil may be a crude oil, topped crude, or refined oil, preferably in the A.P.I. gravity range from 18° to 32°. Crude oils obtained from different producing areas classified as paraffin base, mixed base, and asphalt base have been tested and found satisfactory for preparing this mud. In some instances crude oils of high aromatic content have been found to require additional chemicals for satisfactory adjustment of the mud properties.

After the pilot testing, the predetermined amount of concentrate is added to the base oil through the hopper. This concentrate is readily wet by oil and therefore mixes rapidly without plugging the hopper. If required, the caustic soda is then added through the chemical barrel in a 35 to 50 per cent solution, and the pits gunned for approximately 30 minutes to insure adequate mixing. As a final step, 0.1 lb. peptizer A per barrel and 0.2 lb. of calcium chloride per barrel are generally then added and the pits gunned for an additional 30 minutes.

The density of the oil-base mud at this stage of preparation is from 7.8 to 8.5 lb. per gallon, depending on the amount of concentrate and the gravity of the base oil. Densities up to 17 lb. per gallon can be obtained by addition of barite.

Properties . . . The properties of this oil-base mud as normally determined by standard A.P.I. procedures are similar to other commercially available oil-base muds.[4,5] Experience has shown, however, that oil-base muds which have identical A.P.I. properties, i.e., viscosity, gel strength, fluid loss, may differ quite markedly under test conditions which more nearly simulate actual field usage at elevated temperatures. Effects of these conditions are discussed herewith.

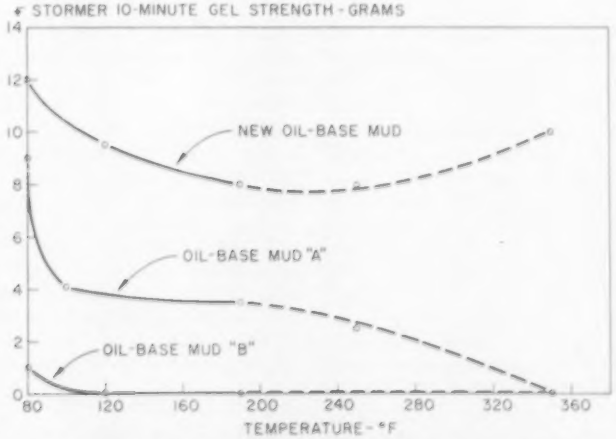
Effect of Elevated Temperatures

The viscosity, gel, and fluid-loss properties of the oil-base and water-in-oil emulsion muds in the temperature range from 80° to 190° F. were determined by standard A.P.I. procedures.[6] Fluid-loss values in the temperature range from 250° to 350° F. were obtained using a special high-temperature, high-pressure tester.[7] The gel properties in the temperature range from 190° to 350° F. were determined after exposure of the muds to the indicated temperatures with only enough cooling to prevent vaporization.

Viscosity . . . Fig. 1 shows the effect of temperature on the viscosity of the new oil-base mud as compared with two other commercially available oil-base muds, designated as muds A and B. The percentage reduction in viscosity of the new mud and mud A over the temperature range from 80° to 190° F. is approximately 65 per cent, whereas the viscosity of mud B was reduced by 90 per cent. This shows the better temperature stabilization characteristics of the new formula since both mud B and the presently described oil-base mud were prepared with similar crude oils.

Fluid loss . . . Fig. 2 shows the effect of temperature of the fluid losses of these same oil-base muds. In conducting the fluid-loss tests in the 250° to 350° F. range the fluids were protected from the air, and the downstream pressures were kept at 1,000 psi. to prevent loss of filtrate by vaporization. From calibration of the instrument at lower temperatures, it is believed that these results are equivalent to A.P.I. fluid-loss values. This is borne out by the smooth curves plotted between low-temperature values in A.P.I. tests and results from high-temperature tests.

The fluid loss of this new mud is 1.2 cc. at 250° F. and 4.8 cc. at 350° F., which compares favorably with mud A, which had a fluid loss of 1.1 cc. at 250° F. and 3.0 cc. at 350° F. Mud B filtered too rapidly at 250° F. to be measured.



GEL STRENGTH high enough to suspend weight material at high temperatures is an advantage of the new mud over both muds A and B. Fig. 3.

Gel strength . . . Fig. 3 shows the effect of temperature on the gel strength of the oil-base muds studied. The new mud and mud A maintain a satisfactory 10-minute gel strength in the temperature range from 80° to 190° F. Mud B had no measurable 10-minute gel strength at temperatures above 100° F. The significance of the data obtained in the temperature range from 190° to 350° F. is that the 10-minute gel strength of the new mud tends to increase slightly with increasing temperature, whereas the gel strength of mud A tends to decrease.

Weight suspension . . . Tests were also conducted to determine if the mud would satisfactorily suspend weighting material at elevated temperatures.

Weight-suspension tests were conducted by placing samples of oil-base muds weighted to 16 lb. per gallon in 3-ft. sections of 2-in. pipe and exposing the muds to a temperature of 350° F. for 2 weeks. The test cells were equipped with side taps at 1-ft. intervals so that portions of the mud column could be removed separately for weight determinations after the exposure period.

As shown in Table 2, the weight increase in the test cells was only 0.7 and 0.8 lb. per gallon, respectively, which indicates excellent weight-suspension properties. Weight increases of from 2.5 to 5 lb. per gallon would be considered as indicative of poor weight-suspending properties.

TABLE 2—Suspension of Weighting Material —Test Mud 16 lb. per gal.

	Weight lb. per gal.	
	Test A	Test B
Top portion	14.9	14.8
Middle portion	16.3	16.4
Bottom portion	16.7	16.8

It is concluded from the results of these high-temperature tests that this new oil-base mud has satisfactory properties for use in wells having bottom-hole temperatures as high as 350° F.

TABLE 3.—EFFECT OF WATER AND SHALE CONTAMINATION ON NEW OIL-BASE MUD

	Water content % by vol.	—40+325 shale added lb./bbl.	Stormer viscosity (cp.)	Stormer gel strength, grams		Fluid loss cc./30 min.
				Initial	10 min.	
Water—						
Oil-base mud*	1		103	6	14	0
Oil-base mud*	20		73	1	1	0.2
Oil-base mud + 1 lb./bbl. petizer A + 2 lb./bbl. calcium chloride	20		142	4	12	0
Shale—						
Oil-base mud*	1	40	75	7	15	2.0
Oil-base mud +1 lb./bbl. peptizer A +2 lb./bbl. calcium chloride	1	40	97	7	18	0

*Prepared by addition of 45 lb. dry concentrate and 0.5 lb. caustic soda to 0.9 bbl. of a 30°-A.P.I. gravity crude oil. The contaminated oil-base mud samples were placed in a laboratory roller oven and agitated for 96 hours at a temperature of 160° F. The samples were then removed from the oven, cooled to 80° F., and the properties determined.

TABLE 4—CONTROL OF PHYSICAL PROPERTIES OF OIL-BASE MUD

Condition to be corrected—	Treatment—
Low viscosity and gel	Add concentrate and/or caustic soda
High viscosity and gel	Add low-viscosity crude or fuel oil
Large amount of water contamination	Add peptizer A and calcium chloride
High fluid loss	Add peptizer A and calcium chloride Gun pits.

TABLE 5—COMPOSITION OF WATER-IN-OIL EMULSION MUD

40 to 50 lb. dry concentrate
0.4 to 0.6 bbl. of diesel oil or low-viscosity crude oil
0.4 to 0.6 bbl. of either fresh water or brine
1.5 to 2.5 lb. of peptizer A
3 to 5 lb. calcium chloride

TABLE 6—PROPERTIES OF WATER-IN-OIL EMULSION MUD

Mud description—	Stormer viscosity (cp.)	Stormer gel strength, grams		Fluid loss cc./30 min.
		Initial	10-min.	
Prepared initially				
0.5 bbl. diesel oil 0.5 bbl. fresh water 50 bl. concentrate 2 lb. peptizer A 4 lb. calcium chloride	57	1	2	0
0.4 bbl. diesel oil 0.6 bbl. fresh water 40 lb. concentrate 1.5 lb. peptizer A 3 lb. calcium chloride	115	2	7	0
Conversion				
Oil-base mud	103	6	14	0
+ 2 lbs. per bbl. peptizer A + 4 lb. per bbl. calcium chloride + 20 per cent diesel oil + 80 per cent fresh water	139	3	9	0

Effect of Contaminants

This mud, like other oil-base muds or inverted emulsions, is not significantly affected by common contaminants such as cement, anhydrite, and salt. Fresh water and bit cuttings or wall fragments, particularly hydratable shale, are generally regarded as the most detrimental contaminants of oil-base drilling muds. These contaminants, either separately or in combination, can result in severe maintenance and operational problems.

Peptizer A and calcium chloride protect this oil-base mud from the deleterious effects of fresh water and shale contamination. These chemicals apparently react to form a preferentially oil-wet coating on particles contained in the mud, thus preventing them from becoming hydrated and dispersed if contacted by water. This effect is illustrated in Table 3.

Contamination of the mud with 20 per cent fresh water causes a significant decrease in gel strength and a slight increase in fluid loss. Contamination with 40 lb. shale per barrel had no effect on the gel strength but significantly increased the fluid loss. When the mud was pretreated with 1 lb. peptizer A per barrel and 2 lb. of calcium chloride per barrel, these contaminants had no appreciable effect on the gel strength and fluid-loss properties.

The results of these tests show that addition of small quantities of treating additives (peptizer A and calcium chloride) stabilizes this mud against the effects of water and shale contamination.

Control . . . This oil-base mud will normally require little attention after the initial mixing; however, should adjustment of the properties be required, the treating procedures shown in Table 4 are applicable. For example, if the mud becomes contaminated with a large amount of water, treatment with peptizer A and calcium chloride is recommended. The same treatment would also be effective for reducing fluid loss.

Field Tests

Woodbine formation, East Texas—Coring . . . The oil-base mud has been successfully used as a coring, comple-

tion, perforating, and drilling fluid. A typical application was the coring of approximately 145 ft. of the Woodbine formation in East Texas. Over-all core recovery was approximately 81 per cent and coring rates in the sand and shale formations were 4 and 30 minutes per foot, respectively. After each core was cut, the hole was reamed from 6⅛ to 7⅞ in. No difficulty was encountered with this fluid during the coring and reaming operations, and an examination of the cores indicated that no noticeable flushing or invasion of mud or mud filtrate had occurred.

Some trouble was met in displacing the high-viscosity water-base mud from the hole, and this mud together with some mud which could not be removed from the partially buried steel pits increased the water content of the oil-base mud to approximately 9 per cent. This contamination, although it had no serious effect on the mud properties, could have probably been minimized by lowering the viscosity of the water-base mud prior to displacement.

Matagorda County, Texas—Perforating and completion . . . In another operation in Matagorda County, Texas, the oil-base mud was weighted to 16.5 lb. per gallon and spotted in the lower section of the well bore for running a perforating gun and the setting of a packer. The bottom-hole temperature in this well was 325° F. No thickening at the interface of the oil-base and water-base muds was apparent as the perforating gun was run to bottom. When the oil-base mud was circulated from the hole after 4 days of formation testing, no hard settling of solids was evident.

Other successful applications include the use of this mud for drilling and completing shallow wells in Pontotoc County, Oklahoma, and as a completion fluid for high-temperature wells in Colorado County, Texas.

Water-in-Oil Emulsion

The dry concentrate and treating additives can also be used for preparing a water-in-oil emulsion mud having excellent properties. The composition of the mud is shown in Table 5.

The preferred method of preparing the water-in-oil emulsion mud is to add the concentrate, peptizer A, and calcium chloride to the oil followed by addition of the water. Addition of the ingredients in this order insures the formation of a water-in-oil type of emulsion. Typical examples of emulsions prepared in this manner are shown in Table 6.

These examples illustrate the effect the concentration of the internal phase (water) has on the viscosity and gel properties of the emulsion. In the first example the emulsion mud prepared with 50 per cent fresh water by volume has a viscosity of 57 cp. and a 10-minute gel strength of 2 g., whereas in the second example the emulsion mud prepared with 60 per cent fresh water has a viscosity of 115 cp. and a 10-minute gel strength of 7 g.

Table 6 also shows the results of converting the oil-base mud to a water-in-oil emulsion. In the example shown, conversion is accomplished by adding 20 per cent diesel oil, 2 lb. of peptizer A per barrel, 4 lb. of calcium chloride per barrel, and 80 per cent fresh water to the oil-base mud. Addition of the diesel oil was necessary prior to conversion to prevent the viscosity of the resulting emulsion from becoming excessive.

The water-in-oil emulsion, like the oil-base mud, can be weighted to 17 lb. per gallon by addition of barite.

Applications . . . The following may be used as a guide in determining the proper use of these new drilling fluids:

As an oil-base mud
Native-state coring.
Completion and workover fluid.
High-temperature applications.
Perforating fluid.

As a water-in-oil emulsion mud
Completion and workover fluid.
Drilling long sections of hole.
Perforating fluid.

References

1. Davis, D. M. "Discovery Due to Oil-Base Mud," The Oil and Gas Journal, p. 95 August 8, 1955.
2. Wright, C. C. "Oil-Base Emulsion Drilling Fluids": The Oil and Gas Journal, pp. 88-90, March 29, 1954.
3. Lummus, J. L. "Multipurpose Water-in-Oil Emulsion Mud": The Oil and Gas Journal, pp. 106-108, December 13, 1954.
4. Miller, George, "Oil-Base Drilling Fluids": The Oil and Gas Journal, pp. 102-122, March 10, 1952.
5. Bright, K. B. "How Does the Drilling Contractor Regard Oil-Base Drilling Fluid": The Oil and Gas Journal, p. 276, September 29, 1952.
6. A.P.I. Code 29 "Recommended Practices on Standard Field Procedure for Testing Drilling Fluids": Third Edition, May 1950.
7. Schremp, F. W., Johnson, V. L., "Drilling Fluid Filter Loss at High Temperatures and Pressures": Journal of Petroleum Technology, pp. 157-162, June 1952.

BOOKS

HIGH-PRESSURE TECHNOLOGY, by Edward W. Comings. Published by McGraw-Hill Book Co., Inc., 330 West 42nd. Street, New York 36. 572 pages, $11.50.

This book covers the whole field of high-pressure technology at a level that can be understood by a senior student of chemical engineering. The central theme is the influence of elevated pressure on chemical and physical systems, and on the design of equipment for handling these systems.

The book develops the principles governing the properties of metals, and then deals with treatment of metals and alloys for use in publication of related material.
high-pressure equipment. Procedures and suggestions for safety practices, principles of design of many types of equipment, are stresses and strains in thick-walled cylinders considered in some detail.

Other topics include: apparatus and techniques for measuring elevated pressures; effect of pressure on gases and liquids and the application of thermodynamics to single and multiphase systems; the effect of high pressure on the chemical-engineering unit operations; the effect of pressure on chemical equilibrium; and principles of design of high-pressure reactors.

The final chapter provides a relatively extensive discussion of the process for the synthesis of ammonia, which was selected as an example of a high-pressure chemical process.

The volume should serve as both a reference and textbook for engineers and scientists.

CLAYS AND CLAY MINERALS. Proceedings of the Third National Conference on Clays and Clay Minerals. Edited by W. O. Milligan, Rice Institute. Published by National Academy of Sciences National Research Council, 2101 Constitution Avenue, Washington 25, D. C. 573 pp. $7.

About 300 persons participated at the Third National Conference on Clays and Clay Minerals held in October 1954 at Rice Institute. The proceedings of this conference are published in this book. The active discussion and enthusiasm of the meetings indicated the need and value of such conferences and

Several of the papers included are concerned with electron microscopy and X-ray and electron diffraction studies on various clays. Every effort was made to reproduce details of numerous high-resolution and high-magnification electron micrographs.

Identification of clay minerals, swelling of clays, ion-exchange capacity, viscosity, peptization resistance, hydrogen-ion catalysis, rheological behavior, interstratified layers, effect of acid and heat treatment, and other topics are given detailed attention.

The conference proceedings contain 43 papers by 69 contributors, including seven papers presented at the 1954 Pacific Coast Regional Conference on Clays and Clay Technology which was held at University of California in June 1954.

RADIOISOTOPES — THE WONDER TOOL. Published by Callahan and Hollowell, Evans Building, Washington, D. C. 90 pages, paper cover, $7.50.

The book describes case histories and specific methods by which 28 industries are applying the use of radioisotopes to automatic process control in assembly-line techniques.

There are more than 1,100 examples which show how instrument manufacturers have applied radioisotopes to automation, and to time-saving, cost-reducing processes.

Radioisotopes are saving industry more than a quarter billion dollars a year, a figure expected to climb to a billion dollars a year within 5 years.

The book is based on a survey of several hundred industries, 28 of which were selected for review purposes. Many of the applications described apply to other industries.

DIRECTORY, GULF COAST SECTION, A.I.M.E. (1956). $1. Available from H. M. Krause, Humble Oil & Refining Co., P. O. Box 2180, Houston, Tex.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

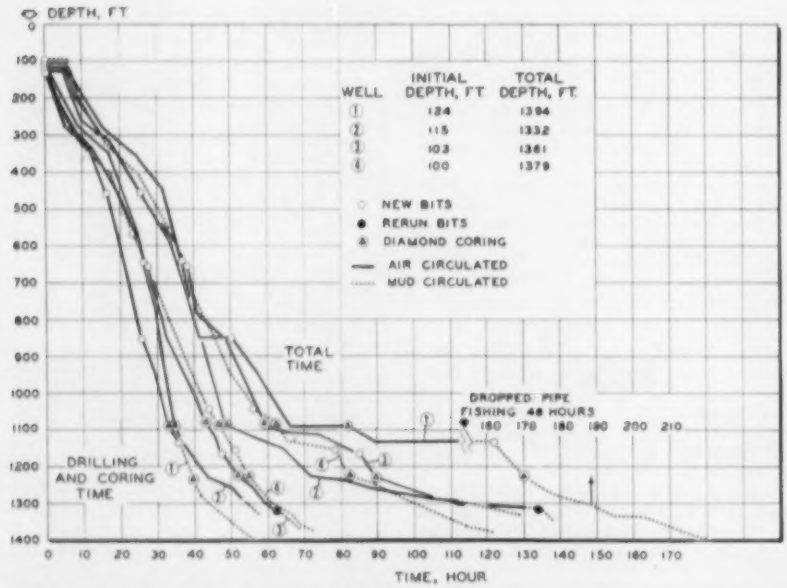
RIG AND EQUIPMENT used by Mora Drilling Co. to air-drill 1,400-ft. wells in Bird Creek. The two rotary compressors are rated at 600 cu. ft. per minute at 125 psi. Fig. 1.

Operators plagued with variety of problems as . . .

Air Drilling Falls Short

by J. O. Scott
District Editor

Only slight water seepage has been the ruin of air drilling and coring in the 1,300 to 1,400-ft. wells of Bird Creek field just north of Tulsa. Air has failed to save any time over mud drilling and coring. Penetration rates have been greater but time lost keeping holes clean and washing off balled bits and collars has made the air tests more costly. Higher air pressures and more air appear needed.



TIME COMPARISON of air and mud-drilled holes shows that over the total depth, drilling was faster with air. Elapsed time was longer. Drilling time includes connections and time spent on bottom unballing bits. Fig. 2.

ABILITY of a bit to make hole faster with air rather than mud circulation has led to widespread use of air drilling. Success of this method, however depends on the amount of water seepage encountered. In the case of shallow air drilling in Bird Creek field in Tulsa County, Oklahoma, only slight water seepage has slowed air drilling and coring rates down to those obtainable by mud circulation.

Problems with the water have shown up in balled or stopped bits and balled drill collars. Air-circulation rates in the range of those used in successful air drilling have been used. But in this case the air supply has appeared inadequate.

Pressures available have been in the range of only 100 to 125 psi. These are sufficient for normal circulation but are inadequate for overcoming conditions brought on by water seepage.

Areas of success . . . Shallow air drilling to the Bartlesville sand has been successful in a number of areas of northeastern Oklahoma. One operator has been drilling 400 to 600-ft. wells using air to develop Bartlesville-sand water floods.[1] Holes have been 6¼ in. and an air rate of 600 cu. ft. per minute has been adequate, even when water produced reaches as high as 600 bbl. per day. Average velocity of the air in the annulus has been estimated at about 4,100 ft. per minute.

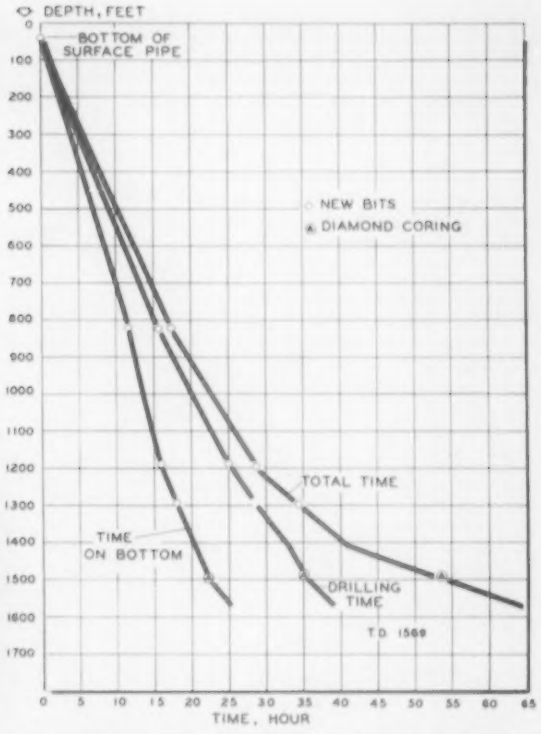
Experience gained by this operator showed that as much as 200 ft. of fluid could be blown out of the air-drilled holes without difficulty if a working air pressure of 125 psi. was available. However, the case of a high rate of water influx was not as difficult to handle as the case where rate was confined to about 3 to 5 bbl. per day of fluid. Low seepage rate appears to be the big problem in the Bird Creek drilling. This is the condition that causes balling of fine air-drilled cuttings.

One procedure that has been found helpful in drilling formations with low rates of water seepage is to use a water pump to quickly inject a few barrels of water into the hole when balling commences. This procedure has also been used in the Bird Creek drilling but without too great success. Besides, the process of trying to unball the bit has been very time consuming.

Bird Creek . . . In the Bird Creek tests, four holes were drilled—three with air and one with mud. Reed Drilling Co. drilled the first and Mora Drilling Co. drilled the other three. Fig. 1 shows the rig and equipment used by Mora.

For this drilling the rig time has been

FLAT ROCK HOLE only 5 or 6 miles from Bird Creek went down fast with air drilling. This rig of Reed Drilling Co. used three compressors with a total capacity of 1,800 cu. ft. per minute at 200 psi. Fig. 3.



TIME RECORD on the Flat Rock hole showed a drilling time of 23 hours to reach 1,100 ft. Best time at Bird Creek was about 33 hours. Mud drilling took 46 hours. No water troubles were encountered at Flat Rock. Fig. 4.

analyzed to show total time elapsed from below surface pipe and total drilling time, which is elapsed time less trip time, reaming time, hole cleaning, and rig repairs. The time comparison between the air-drilled holes and the mud-drilled hole is shown in Fig. 2.

Down to the coring point (about 1,090 ft.) on these wells, air-drilling time was somewhat less than mud-drilling time—an average of 37 hours against 46 hours. Total time elapsed, however, averaged 60 hours for air and was also 60 hours for mud. Loss of this time advantage was due to the problem of keeping the bit and hole clean during the air drilling.

After diamond coring began, air completely lost its advantage. On the two wells where air was used for any distance coring time from 1,090 to 1,300 ft. took 17 hours while mud coring time was only 15 hours. However, elapsed time in this interval for air coring (includes reaming and trips) was 58 hours but only 40 hours for mud coring.

Bit balling was worse during air coring than during air drilling. A number of short cores had to be pulled because the bit plugged up. In all three air-drilled holes, progress became so slow during coring that mud circulation was used to finish the holes.

Hole conditions . . . In the first hole, some 8 hours' drilling time was lost at 849 ft. A water seep occurred at 676 ft. Although hole was made on down to 849 ft., the compressors failed to keep the hole clean and mud was needed temporarily. Then the mud had to be cleaned out 120 ft. at a time to continue the air drilling.

Reed Drilling Co. used two 350-cu.-ft. per minute piston type of compressors and one 600-cu.-ft. per minute rotary compressor on this hole. Hole size was 7⅞ in. and 6⅛-in. core heads were used. Maximum compressor output was 125 psi. Although only 60 to 70 psi. was needed during normal drilling, insufficient pressure was available to keep down hole-cleaning time.

Reed estimates that a capacity of 1,200 to 1,800 std. cu. ft. per minute with an available pressure of at least 350 psi. is required for best drilling results under the Bird Creek conditions. In a 1,000-ft., 7⅞-in. hole with 4½-in. drill pipe, minimum annular velocities of 2,900 to 3,200 ft. per minute would be obtained with the above rates.

Hole size for the other two air-drilled holes was 6¾ in. and 6⅛-in. core heads were also used. Mora Drilling Co. used two 600-cu. ft. per minute piston compressors with a 125-psi. pressure rating. Circulating at the rate of 1,200 std. cu. ft. per minute with 3½-in. drill pipe in a 1,000 ft. 6¾-in. hole would produce a minimum annular velocity of 3,100 ft. per minute.

These annular air velocities are well within the range used in successful air drilling. Note that they are minimum velocities. Velocity increases as the air comes up the hole and will be two to three times the above rates at the top of the hole.

Nearby well . . . Apparently the exact water-seepage conditions to cause trouble to air drilling in the shallow

TABLE 1—COMPARISON OF COST OF DRILLING TO AND CORING BARTLESVILLE SAND IN BIRD CREEK FIELD, OKLAHOMA

	Air drilling		Mud drilling
	Well No. 2	Well No. 3	Well No. 4
Rig time below surface ($25 per hour)	$3,525	$3,200	$3,050
Bit cost ($45 for retipped bits)	135	90	180
Compressor rental ($708 per week)	578	490	
Mud cost			232
Total	$4,238	$3,780	$3,462

formations above the Bartlesville vary quite a bit from area to area. In nearby Flat Rock field of Osage County, at a location only 5 or 6 miles from the Bird Creek air drilling, Reed Drilling Co. air-drilled a hole with very good success last year. Fig. 3 shows the rig and the compressors on this hole. Capacity of the three piston compressors totaled 1,800 cu. ft. per minute with a pressure rating of 200 psi.

At Flat Rock, penetration of the Bartlesville sand requires holes 1,400 to 1,500 ft. deep whereas holes to the same objective are only 1,300 to 1,400 ft. deep at Bird Creek. The depth of the Flat Rock air-drilled hole was 1,569 ft. while the average depth of the Bird Creek holes was 1,362 ft. Yet the total drilling and coring time below surface pipe was only 65 hours on the Flat Rock hole and averaged 144 hours on the Bird Creek holes excluding 48 hours for fishing on one hole. Converting over to mud circulation was necessary on all the Bird Creek holes to complete them.

Fig. 4 shows the drilling-time record for the Flat Rock hole. The time required to go from below surface pipe at 44 ft. to 1,569 ft. total depth is broken into three parts—(1) actual time bit was on bottom, (2) drilling time which includes making connections, picking up pipe, and cleaning bit during drilling, and (3) total elapsed time including reaming and trips. Average penetration rate for air drilling was 67.5 ft. per hour and for coring was 23.4 ft. per hour.

Operating conditions . . . Weight on bit and rotary speed have been about the same in both Flat Rock and Bird Creek drilling. After enough pipe was in the hole, Reed carried from 8,000 to 10,000 lb. on 7⅞-in. bits with rotary speeds of 70 to 90 r.p.m. In 6¾-in. holes, Mora carried four 5½-in. collars with about 8,000 lb. on the bit and rotary speeds of 80 to 90 r.p.m.

Bit savings . . . Air drilling has required fewer bits despite the lack of success at Bird Creek. In the first hole at Bird Creek, Reed needed three bits to air drill from 124 to 1,090 ft. On the other air-drilled holes at Bird Creek Mora used two bits on one and three bits on the other. These were retipped bits and were all that was needed for both air drilling and reaming of the core hole. The mud-drilled hole required four bits for drilling and reaming.

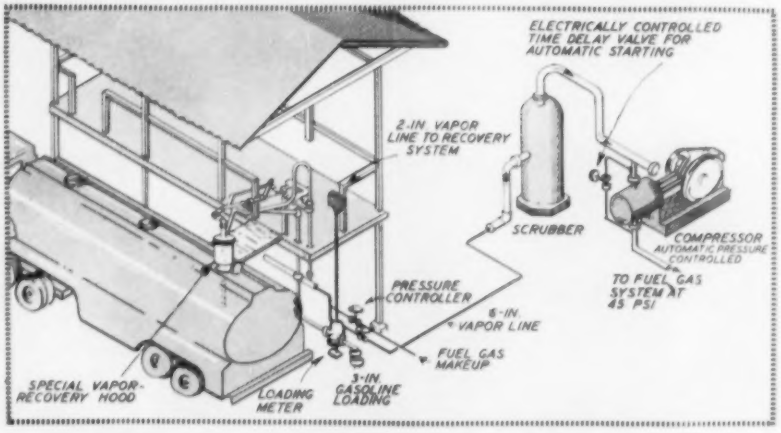
Despite bit and mud savings, air drilling and coring has cost more than the mud drilling and coring. Table 1 shows the comparison for the last three holes drilled by Mora Drilling Co. Rental of diamond core heads and miscellaneous costs are not included since these costs are about the same for all wells.

Cost of drilling is shown in Table 1 to be dependent mainly on rig time. As a result of the longer total times required in the air-drilled holes, they cost more. Average costs for air drilling are about $550 more than costs for the mud drilling.

Reference

1. Brundred, L. L., "Air Drilling Shallow Water-Flood Well," The Oil and Gas Journal, June 11, 1956, p. 144.

ON THE JOB . . . . . IN THE PLANTS



LOADING-RACK DIAGRAM shows how vapor-collection head is used.

Vapor-Recovery System Reduces Evaporation Loss

THE vapor-recovery systems being installed at loading racks of General Petroleum Corp. consist of three major parts:

1. A vapor-collection head. This device fits on the fill spout at the loading rack. When the fill spout is put into an empty tank-truck compartment, the vapor-collection head fits securely into the loading aperture. A neoprene collar on the head forms a vapor-tight seal.

As fuel moves into the empty compartment, it displaces vapor-laden air which moves upward into the vapor-collection head.

From the head, the vapors go into a pipe which carries them away. The vapor is kept from entering the atmosphere. The head is transparent to enable the loader to see when the compartment is full.

2. Compressors. Two compressors keep a constant vacuum on the lines leading from the vapor-collection head. This suction pulls the vapors through the lines leading away from the loading rack. The vapors pass through vessels where liquids are separated out and reclaimed for processing. The remaining gases are then pushed into the fuel system of the refinery.

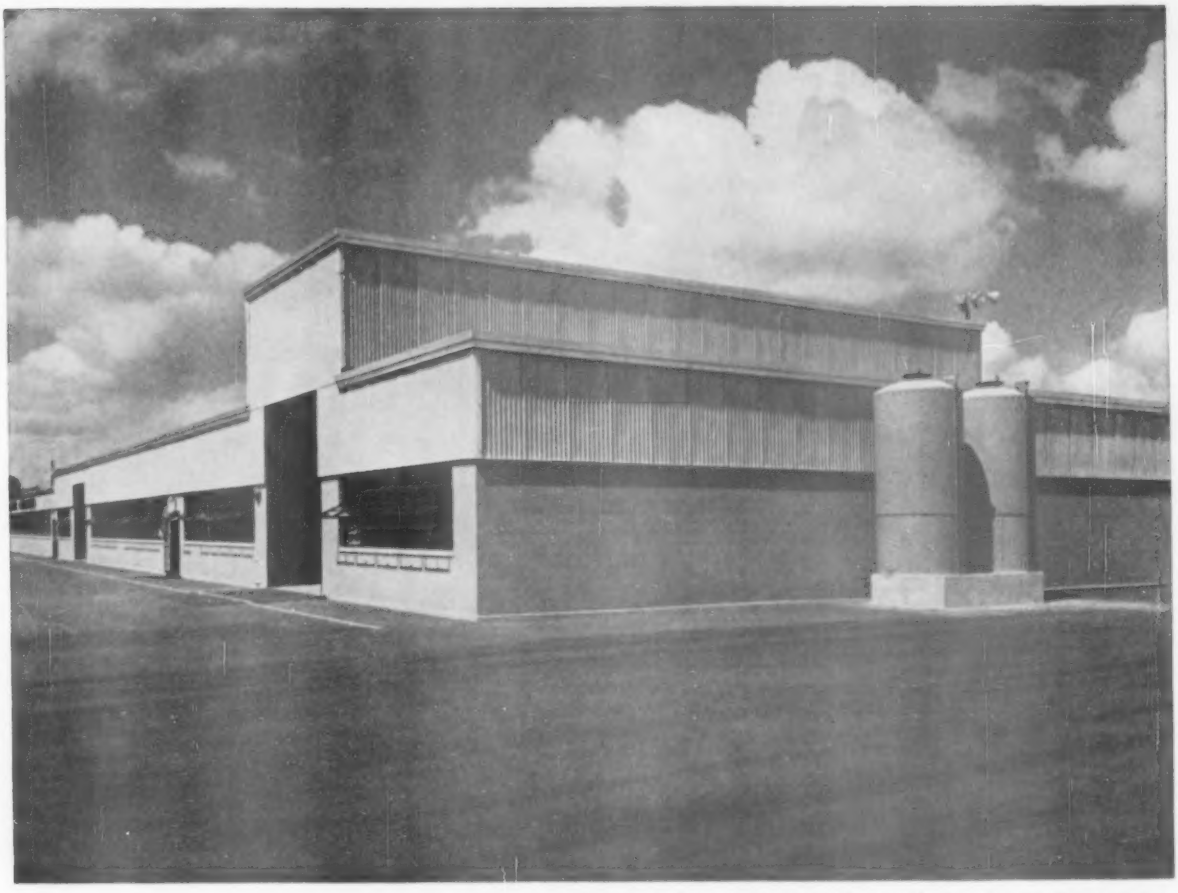
NEOPRENE COLLAR makes vapor-tight seal.

3. Piping. A network of pipes connects the vapor-collection head with the compressors, and connects the compressors with the fuel system of the refinery. Each installation involves about 3,000 ft. of large-size pipe.

The vapor-recovery systems are being installed at Torrance Mobilgas refinery and the company's distribution terminal at Vernon. Together the installations cost a total of $130,000.

They will keep a total of 1,134 gal. per day of evaporated gasoline from entering the atmosphere. This is approximately 16/100 of 1 per cent of the total volume of gasoline loaded each day at the two loading racks.

When all refineries in the Los Angeles area are equipped with similar devices, hydrocarbon emissions from refineries will be reduced by 17 tons per day.



K&M Corrugated Asbestos Sheets, used as siding on the Operations Center of a southeastern utility company, complement the clean, modern lines of the building. These sheets are also used on a pitched roof, not shown in the photograph. Engineering and supervision of construction: Stone and Webster Engineering Corporation. Applicator: Whatley Roofing and Sheet Metal Works, Tampa, Florida.

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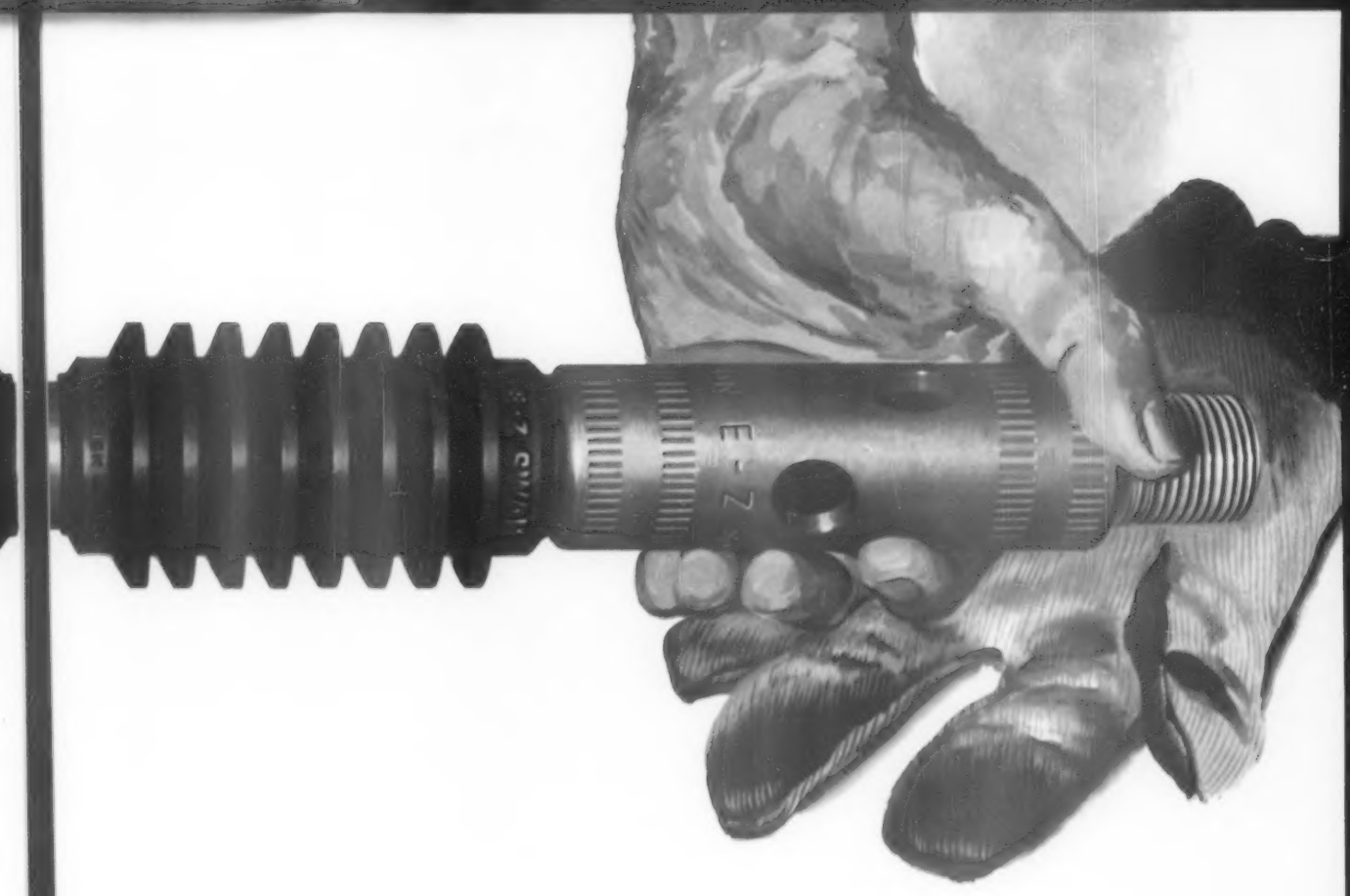

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Texas oil companies prove the value of split channel radio operation

G-E narrow band equipment serves Loffland Brothers, Standard of Texas, and Seaboard Oil Company

In the Texas oil fields they'll tell you that *practical* split channel radio operation is proving its worth right now. Two major oil companies and a major drilling contractor, operating in an area pointing north from Odessa to Vealmoor and Snyder, have cooperated in establishing three independently operated systems in a range that formerly served two firms.

Rather than share a channel when Loffland installed radio in the area covered by Standard's 48.74 MC frequency and Seaboard's 48.78 MC allocation, the three firms decided to work on an experimental split channel basis. Slight modification of G-E equipment in use narrowed the spacing from 40 KC to 20 KC, permitting Loffland Brothers' new General Electric radios to go on the air on 48.76 MC.

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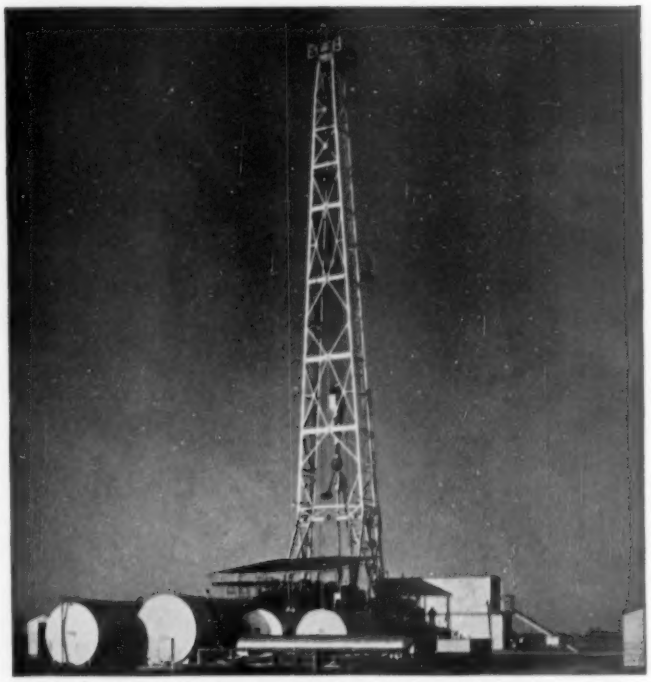
Your General Electric Communications Counselor will be pleased to cooperate with you in planning a split channel operation for your company. Call him in, or write today to: *Section X8126-10, General Electric Company, Communication Equipment, Electronics Park, Syracuse, New York.*



RADIO ANTENNA CAPS LOFFLAND BROTHERS' RIG near Odessa, Texas. Nine General Electric base stations and mobile radio units have cut $400 per month from former telephone costs.

STANDARD OIL OF TEXAS operates two G-E 60-watt base stations linking seven mobile units with the main base at Snyder, Texas. Radio speeds orders, makes instant decisions possible for fast action.

SEABOARD OIL COMPANY maintains instant operational contact with field locations through 5 G-E base stations. 20 mobile units coordinate widespread drill site activities in the West Texas area.

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Automatic Custody Transfer

. . . and sees a promising future ahead for it

1. Changed Thinking Has Resulted in Favorable Climate for Development

by H. C. Packard

This is a portion of a report to the 1956 meeting of the A.P.I. by three members of the Committee on Crude-Oil Measurements. Their report shows a promising future for L.A.C.T. (lease automatic custody transfer).

UNTIL recently, manual gaging, sampling, and testing of lease tanks have varied mostly in detail improvements to otherwise generally accepted and retained ideas. This has been the case rather than any real changes in basic concept or design. This has presented somewhat of an anomaly, the work in question being as it is an inherent part of the otherwise dynamic and progressive petroleum industry.

In recent years, a change in thinking has developed. With automation developing at a rapid pace in other fields, oil producers recognized that methods of handling crude oil needed review and modernization. Developments in this respect now are gathering momentum, particularly in measurement.

Efficiency and economics . . . Various factors have contributed to focusing attention on the need for regarding measurement in a more important light. This recognition stems primarily from two causes: (1) using measurment in itself as a more efficient means for operational controls; (2) the realization of potential economic advantages and reliability in measuring operations. Underlying all of this is the obligation to prevent waste of natural resources, so that conservation is an objective for all.

The A.P.I. Committee of Crude-Oil Measurements has been aware of these changes taking place. This group has taken an active interest in the matter and in its broadest aspects. This has been done by providing an objective atmosphere in which to evaluate measurement developments. This then will permit the eventual recommending for use of those methods found acceptable.

This committee's approach already has resulted in recommendations for:

1. Automatic forms of tank gages.
2. Automatic forms of oil-temperature determination and sampling instruments.
3. An A.P.I. symposium 2 years ago on significance of petroleum quantitative measurement.
4. Just now an informational technical bulletin on this matter of automatic custody transfer of crude oil.

We must keep abreast of these developments. At the same time, we still have the sympathetic understanding that the former types of facilities and methods which most of us now use must be, in many cases, continued in use and recognized for a considerable time. While we are building higher into the development atmosphere of the future, we yet must always remember to keep our feet firmly grounded in the realities of the present.

L.A.C.T. . . . Most recent of these equipment developments is that of automatic custody transfer of crude oil. The industry frequently refers to this simply as "Lease Automatic Custody Transfer" or "L.A.C.T." for short. This development may be defined as consisting of equipment and procedures whereby the measuring of quantity and quality and the running of crude oil from the producers' leases to the connected pipeline is accomplished on a completely automatic and therefore unattended basis and all in accordance with any predetermined schedules required and applicable regulations.

Detailed technical descriptions of L.A.C.T. systems is available in comprehensive form in the just-published A.P.I. Bul. 2509A. Additional details may be had from numerous other literature sources listed in Table 1.

Such systems generally may be classed broadly as either (1) volumetric chamber measuring, or (2) meter measuring. The former may be in various tank-number and tank-type combinations. The latter may be either a wholly automatic system or one only partially so. A summary of currently known installations by company, location, and type is given in Table 2.

Each type of system must include "fail-safe" features to provide assurance against mismeasurement due to all reasonably forecastable causes. Each also must provide the quality monitoring required to prevent running nonmerchantable oil into the pipeline. Time and quantity operating controls must be included to provide for such matters as compliance with production regulations and ability of pipeline to receive. All of these and other necessary features are detailed in the literature sources mentioned.

Automation cycle . . . Such systems also are designed for desirable sequential integration with the other automatic equipment already available for normal lease operations, such as lifting, separation, treating, and production testing. The L.A.C.T. development then simply becomes the "end of the line," rounding out a cycle of completely automatic lease operation.

Author is with Shell Oil Co., New York, N. Y., and is chairman, A.P.I. Committee on Crude-Oil Measurements.

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TABLE 1—LEASE AUTOMATIC CUSTODY TRANSFER INSTALLATIONS, NOVEMBER 1956

Producer and location—	Pipeline	Basic volume measurement by	Date of first installation	Automatic custody transfer begun
Stanolind Oil & Gas, Duncan, Okla.	Service PL.	Tank	Apr. 1956	
Texaco Exploration, Bonnie Glen, Alta.		Two systems Tank and meter	Apr. 1956	
The Texas Co., Wilson Creek, Colo.	Utah O. & R. Co.	Meter	Early 1954	
The Texas Co., West Cote Blanche, La.	Texas PL.	Tank	1956	Approved Feb. 1956
The Texas Co., Naval Reserves, Okla.	Mid-Continent	Tank	Sept. 1956	
Gulf Oil Corp., Bloomer, Kans.	Kaw PL.	Tank	Dec. 1955*	Dec. 1955
Western Gulf, Yorba Linda, Calif.	Union Oil Co.	Meter	Sept. 1956	
Gulf Oil Corp., North Ward Estes, Tex.	Gulf	Tank	Under const.	
Imperial Oil Co., Redwater, Alta.	Imp. PL.	Meter	Oct. 1955	Nov. 1955
Imperial Oil Co., Excelsior Batt 1	Imp. PL.	Meter	Sept. 1956	Sept. 1956
Imperial Oil Co., Excelsior Batt 2	Imp. PL.	Meter	Nov. 1956	Sept. 1956
Shell Oil Co., Antelope, Tex.	Sinclair PL.	Tank	Feb. 1948†	Approved, started Oct. 1, 1956
Shell Oil Co., Wasson, Tex.‡	Shell PL.	Two systems Tank and meter	July 1953§	
Shell Oil Co., East Texas	Shell PL.	Two systems Tank and meter	Aug. 1956¶	
Shell Oil Co., Brea, Calif., Mechego	Shell Oil	Meter	May 1956	Late 1956
Shell Oil Co., Brea, Calif., West Puente	Shell Oil	Meter	July 1956	Late 1956
Phillips Petroleum, Panhandle, Tex. (Ranch "C" lease)	Phillips PL.	Tank	1956	Approved Sept. 1956
Phillips Petroleum, North Burbank, Okla.	Phillips PL. and Mid-Cont. PL.	Tank	Aug. 1956	Sept. 1956
Phillips Petroleum, Basal, Okla.	Service PL.	Tank	Under const.	
Sinclair, Wertz Dome, Wyo.	Sinclair PL.	Meter		
British American		Meter		

OTHER INSTALLATIONS NOT PLANNED FOR COMPLETELY UNATTENDED OPERATION

Humble Oil, Anahuac, Tex.	Humble PL.	Meter	1954	Hearing Aug. 1956
Humble Oil, Friendswood, Tex.	Humble PL.	Meter	1954	
Humble Oil, Conroe, Tex.	Humble PL.	Meter	1954	

*Originally installed Glenn Pool, Oklahoma, early 1954. †Revised over several years. ‡Have 25 tank-measurement batteries equipped for immediate conversion to A.C.T. on approval in Wasson and Harper fields, Texas. §Revised over several years. ¶Original installation 1952. Revised over several years.

Costs vary with type of system, and may run to a few thousand dollars; but being justified in savings in other investment, operating expense, and conservation. In any case, for leases justifying such installations, the advantages are many and are shared by various of the parties concerned in the custody transfer. Also, present system costs may be much reduced by whatever improvements and simplification can be jointly developed by industry and manufacturer-suppliers.

Team work . . . Historically, development of L.A.C.T. systems has been done largely by producers. The primary reason for this is that the tanks in which measurement has been made for so long have, by tradition, been purchased and installed by the producer. Nevertheless, pipeline companies have shown a great deal of interest and have been influential in design of all types of L.A.C.T. systems, particularly recently for the meter measuring types. Industry-wide exchange of information, ideas, and design and test data has been accomplished largely through the L.A.C.T. special-project function of the A.P.I. Committee on Crude-Oil Measurements. Actual design, installation, and testing of specific equipment have, of course, been done by individual companies.

The attitude of the applicable regulatory authorities appear receptive if each applicant for authorization has properly designed his system, taking into account the recommendations made from our successful experience already gained with such systems. We have some precedents of record to sustain this line of thinking:

1. The Alberta Petroleum and Natural Gas Conservation Board, on November 15, 1955, granted permission to Imperial Oil, Ltd., and Imperial Pipeline Co. for 6-month trial, on an automatic basis, of a meter type of system in Redwater field.

2. The Louisiana Department of Conservation, in February 1956, granted permission to The Texas Co. for 3-month trial, with checking by conventional measurements, of its tandem tank type of automatic battery No. 4 in West Cote Blanche field.

3. The Texas Railroad Commission, on August 22, 1956, granted permission to Phillips Petroleum Co. and Phillips Pipe Line Co. for 6-month trial, on an automatic basis, of Phillips' tank type of system on the Ranch "C" lease in Panhandle field.

4. The Texas Railroad Commission, on August 22, 1956, granted permission to Shell Oil Co. and Sinclair Pipe Line Co. for 6-month trial, on an automatic basis, of Shell's two-tank measuring system with weirs on the Hugh Henderson lease in Antelope field.

5. The Oklahoma Corporation Commission, on April 12, 1956, approved L.A.C.T. at North Burbank. The U. S. Department of Interior and the Osage Indian Agency, on April 5, 1956, also approved this installation. The commission at this same time also approved an L.A.C.T. battery for a lease in southern Oklahoma.

Bibliography

Hamill, R. A., (Service Pipe Line Co.), "New Look for Field Tank Gaging," World Oil, Nov. 1955.

"Sinclair Deal Presages Day of Fully Automatic Production," Petroleum Week, Nov. 11, 1955.

"Oil Sold Automatically," (Gulf Oil Corp.), The Oil and Gas Journal, Feb. 6, 1956.

"Automatic Sales Slated," (The Texas Co.), The Oil and Gas Journal, Feb. 13, 1956.

Hubby, L. M., (The Texas Co.), "Three Choices for Automatic Transfer," The Oil and Gas Journal, Mar. 12, 1956.

Pope, S. H., and Stuntz, R. M., (Gulf Oil Corp.), "Lease Automatic Custody Becomes a Reality," The Oil and Gas Journal, Apr. 23, 1956.

"Automatic Custody Transfer," Special Feature of The Oil and Gas Journal, June 11, 1956.

"Lease Automatic Custody Transfer," A.P.I. Bulletin 2509A, Aug. 1956.

"Automatic Sales at Lease Prove Success," The Oil and Gas Journal, Aug. 6, 1956.

Pope, S. H., (Gulf Oil Corp.), "Lease Automatic Custody Transfer," A.S.M.E. Petroleum Mechanical Engineering Conference, Sept. 1956.

Hebard, G. G., (Phillips Petroleum Co.), "Installation and Operation Experience on Automatic Lease Custody Transfer Battery," A.I.E.E. Electrical Conference of the Petroleum Industry, Sept. 1956, also The Oil and Gas Journal, Dec. 5, 1956.

2. Why Producers Like L.A.C.T.

by Harold S. Kelly

AUTOMATIC custody transfer is attractive to the producer because it offers improvements over manual testing and gaging in stock tanks.

The more significant advantages of lease automatic custody transfer to the producer can be placed in three major categories, viz:

1. Lower initial investment.
2. Better and safer utilization of manpower and reduction in monotonous detail.
3. Increased conservation of natural resources.

Lower Initial Investment

For any typical lease with roughly 100 bbl. per day or more production, the initial investment for an L.A.C.T. battery is less than for an equivalent typical manually operated lease-tank battery. The automatic battery requires the same treaters and settling tanks and settling as does the manual battery. Standby storage for accumulation of possibly a day's production is sometimes required in the L.A.C.T. battery to take care of emergency shutdowns. The major investment savings is the result of the lesser cost of small metering tanks or positive-displacement meters and attendant instrumentation which take the place of the usual storage tanks.

It is obvious that the greater savings in investment will be on the batteries handling the larger volumes of oil; but even on the relatively small batteries, L.A.C.T. requires less investment. Although required investment in L.A.C.T. batteries will decrease further as designs are simplified and standardized, the investment figures portrayed by Fig. 1 are roughly representative of current costs. This figure shows the investment savings presently possible on various sizes of batteries. For example, on a 500-bbl. per day lease, the investment savings would be $2,000, whereas it would be $75,000 on a 5,000-bbl. per day lease.

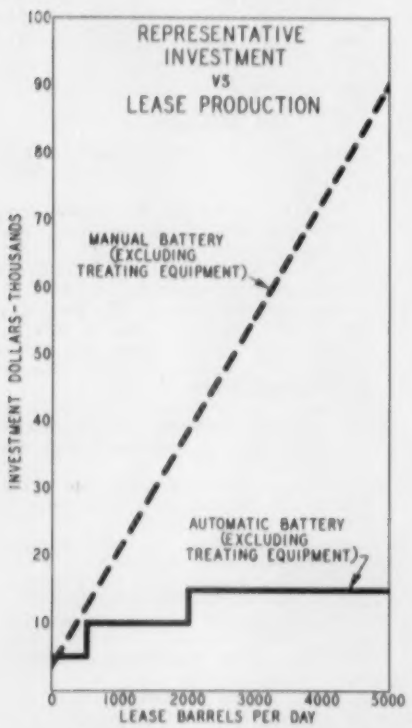
Consolidated batteries . . . The investment advantage which the L.A.C.T. battery has for the larger volumes makes it attractive for tank-battery consolidations. In the past, manual tank-battery consolidations have been effected on unit operations, large leases, or on adjacent leases having common royalty ownership. With present metering and sampling facilities, it is possible to meter and sample the production on separate small leases and then transport the production by lease lines to a central consolidated battery where treating and sale of oil can be handled with a minimum of investment and less operator time.

Another alternative is the metering, storing, and sampling on small leases and then running, at a regular scheduled time, the individual lease production to a central battery for treating and custody transfer to the pipeline. The central battery, by automatic scheduling, could alternately handle production from different leases with different ownership.

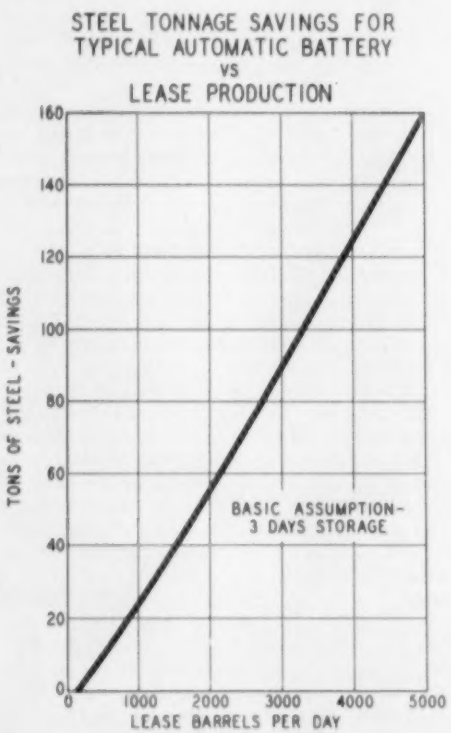
Manpower Use

The amount of operating personnel required for a given lease is influenced by the particular characteristics of the leases and wells, the type of artificial

Author is with Phillips Petroleum Co., Bartlesville, Okla., and is vice chairman, A.P.I. Committee on Crude-Oil Measurements.



INVESTMENT SAVINGS are possible on leases as small as 100 bbl. per day when equipped for L.A.C.T. Fig. 1.



LESS STORAGE capacity necessary reduces considerably the amount of steel on the lease where transfer is continuous. Fig. 2.

lift, the lease equipment including the tank battery, and the operating policies of the producer. The number of steps and time required to carry out the various phases of the typical lease-operating job have been approximated through method studies.

On the basis of these studies it has been concluded that L.A.C.T. battery operating costs will be roughly $1,200 per year less than those for each manual battery that the pumper handles where one or more tanks of oil are run daily from each battery. These figures are based upon the switcher or pumper being required to meet the gager to witness the gaging of tanks.

This operating saving is cut in half where the producer has already worked out an arrangement for sale of oil by an exchange of gage information on written forms deposited in a box at the battery without the requirement that the switcher or pumper witness the gaging and testing of each tank by the gager. Further, these savings can be actually realized only where there is a sufficient concentration of wells and leases to permit profitable redistribution of the operator's time.

L.A.C.T. is the last major phase of complete automation of leases and, therefore, permits more effective utilization of lease operating personnel. Prior to this, the maximum operating benefits from consolidation of manual batteries, automatic well testing, sampling, gaging, and switching were not always realized because manual custody transfer required operating personnel to be present at the battery at various times for gaging, testing, and transfer of production.

The service and maintenance of automatic-control equipment requires a certain amount of time of the skilled technician. However, through regular checks and preventive maintenance, the amount of technician time can be held to a minimum and effectively spread over a broad operation.

The L.A.C.T. battery eliminates the hazards involved in the pumper and gager climbing the stairs and manually gaging and thiefing at the open thief hatch. Where hydrogen sulfide exists in the produced gas, the manual gaging operation is particularly hazardous. Further, the monotony and physical effort of frequent manual gages and recording of them are eliminated by the L.A.C.T. system.

Conservation of Natural Resources

Lease automatic custody transfer contributes to conservation by a reduction in the loss of the lighter hydrocarbons. When compared with conventional lease storage the L.A.C.T. battery offers (1) smaller area of oil surface exposed to the vapor phase, (2) shorter weathering time, and (3) elimination of opening the storage tanks to the atmosphere. Drawoffs for high bottoms are also eliminated.

Tests taken on full-scale trial L.A.C.T. batteries operating in West Texas and northeastern Oklahoma at pressures of roughly atmospheric to 2 oz. which were equal to the manual battery storage pressures, show a minimum of 0.2° gravity increase on 38° to 49° A.P.I. gravity oil. A rough rule-of-thumb is 2½ per cent volume increase for each A.P.I. degree of gravity increase. Therefore, 0.2° increase in A.P.I. gravity represents 0.5 per cent volume increase which is 5 bbl. added to every 1,000 bbl. Further tests operating the L.A.C.T. batteries at the slightly elevated back pressure of only 4 oz., as compared with the previously mentioned atmospheric manual battery, showed increases from 0.6° to 1.4° in A.P.I. gravity.

Limits . . . L.A.C.T. batteries could easily deliver oil to the pipeline at a pressure of 25 psig. However, with present gathering and storage facilities, most transporters and refiners could not retain the lighter hydrocarbons in the oil delivered to them at this pressure. Gasoline plants recover and conserve these lighter fractions for leases connected to them. However, for unconnected leases an increase in delivery pressure to the pipeline could mean a significant increase in the volume conserved and sold by the producer. As L.A.C.T. batteries come into widespread use, there may be economic justification for pipeline systems and refineries of the future to be designed to handle crude at elevated pressures.

An indirect contribution to conservation results from the L.A.C.T. battery adding to the economic justification for over-all lease automation, which includes equipment to automatically schedule and test individual wells on a multiple-well lease. The resulting better well-test data will enable the operator and the reservoir engineer to make reservoir studies and carry on workovers and operations in a more effective manner with a resultant higher percentage recovery of the hydrocarbons in place in the reservoir.

Another indirect contribution to conservation of natural resources is in the reduced consumption of steel. Fig. 2 shows roughly the steel-tonnage savings for various sizes of typical batteries when lease automatic custody transfer is used. For example, 160 tons can be saved on one 5,000-bbl. per day battery.

Application

On the basis of present equipment development and limited operating experience, one may conclude that L.A.C.T. batteries can be justified from the standpoint of investment alone, for volumes of 100 bbl. of oil per day or larger.

When all factors favorable to the L.A.C.T. battery, from the producers' viewpoint, are taken into consideration, it may be possible to justify the use of the L.A.C.T. system on leases producing as little as 50 bbl. of oil per day. This conclusion is based upon the following approximate figures for a 50-bbl. per day battery:

	Manual battery	L.A.C.T. battery
Initial investment*	$3,800	$5,000
Yearly labor savings		300
Value of yearly volume saved†		200
Time required to pay out difference in investment, years		2.4
Return on $1,200 added investment for 15-year life, per cent		41

*Manual battery includes two 90-bbl. storage tanks. L.A.C.T. battery includes two calibrated metering dump tanks and capacitance cell monitor. †(50 bbl. per day) (365 days) (0.005 volume loss) (7/8 net) ($2.65 per bbl.) = $211.

Since the savings used in the foregoing example are conservative, the per cent return realized for the added investment for a 50-bbl. per day L.A.C.T. system may be higher than the 41 per cent shown. In addition, the same L.A.C.T. battery can handle as much as 450 bbl. per day increase in production which may be occasioned through the drilling of additional wells or consolidation with other leases.

"When all factors favorable to the L.A.C.T. battery, from the producer's viewpoint, are taken into consideration, it may be possible to justify the use of the L.A.C.T. system on leases producing as little as 50 bbl. of oil per day."

Automatic Custody Transfer

3. Pipeliner Takes Conservative Viewpoint

by A. H. Newberg

WHEN viewing progress made by the industry, particularly those operational phases which have advanced towards automation, the question arises, "Why have crude-oil measurement methods resisted basic revision?" This can probably be answered best in the words of R. A. Hamill from his article, "New Look for Field Tank Gaging," published in one of the leading trade journals exactly 1 year ago. He gave two fundamental reasons: "(1) The custody transfer of oil is tantamount to the custody transfer of money. (2) Experiments to date with some of the instruments developed to make gaging automatic have been disappointing."

Pipeliner's position . . . The pipeliner, as regards oil-measurement practices, cannot take the position of representing only one branch of industry operation, that of transportation. His company basically does not own any oil, and yet its responsibility involves the wearing of two representative hats: one that of the shippers' agent, and the other that of the pipeline transporter. Although the necessary checks and balances are always available to assure buyer and seller getting value received, the pipeliner, being in the middle in performing the routine measuring, sampling, and testing functions, must take a conservative viewpoint when any significant revisions in practices are considered.

It is interesting to recall that the industry's first effort to reduce gaging to an automatic basis has been largely directed toward transfers at delivery terminals. Although many reasons for such efforts are obvious, it seems basically wrong to expend more effort at this end than at the field end. If there is any place where the necessary manpower can be afforded to supervise the transfer of oil, it is at terminals where the volumes are usually large and the increments for supervision small as compared to similar transactions at the lease-tank level. Therefore, the possibilities of effecting improved measurement, oil conservation, and economic savings appear much greater at the lease tank.

Mr. Packard has stated that lease automatic custody transfer development simply becomes the "end of the line" rounding out a cycle of completely automatic lease operation. I would rather view it as the end of the line for automatic production but the beginning of the line for automatic pipelining, and the only true missing automation link between production and pipelining.

Tests are encouraging . . . Experience reported during this past year with several lease automatic custody transfer systems, some of which have been under test for 2 years or longer and have very recently been approved for a trial period in actual custody transfer use by several state regulatory bodies, is providing good reason for the pipeliner to have renewed confidence in accepting such systems. Although still taking a conservative position of keeping our feet firmly grounded in the realities of the present, we pipeliners are beginning to realize that all new developments need not be directly compared to present methods in order to conform to accepted standards. With many new systems, devices, and techniques tested under field conditions, it is now possible to economically and practically obtain measurement accuracy at least as good as with present manual methods.

It is expected that each pipeline company will consider L.A.C.T. proposals individually, and acceptance of each proposal should be based on a critical analysis of the design and operating features, particularly as regards their ability to control pipeline lease runs where regulations require; assurance that the oil is merchantable before it is run; and assurance that the control and recording system is fail-safe against mismeasurement.

Future of L.A.C.T.

Mr. Packard has brought out that development of L.A.C.T. systems to date has been primarily initiated and designed by the producer; but that the pipelines, primarily through active representation on the A.P.I. special committee, have contributed ideas and been willing to engage in joint testing operations which have had considerable influence on the actual design and types of installation. This initiative by the producer is understandable, considering the great strides made in automatic production methods back of the lease tank itself.

Since loss control is of major benefit to the producer and related interests, such initiative should provide a better understanding and a more clear-cut separation of the problems dealing with losses as against those dealing with accurate measurement. Mr. Kelly's presentation well illustrates the benefits which can accrue to both the large and small producer.

It is true that automatically operated lease tanks will not be economical for all United States production run by pipelines. A study made of leases connected by one pipeline in the Mid-Continent area, including North, West Central, and West Texas, plus New Mexico, Wyoming, and North Dakota, shows that for August 1956, only 5 per cent of the leases ran more than 200 bbl. per day. However, this represents approximately 47 per cent of total oil run from all leases.

Even considering the limited scope of the study, I believe a conservative estimate would be that within 10 years, as much as 25 per cent of the total oil gathered by pipelines will be handled under L.A.C.T. methods. Improvement of the art and standardization of L.A.C.T. systems during this period should permit their economic application to leases handling considerably less than 200 bbl. per day.

Pipeliner's gain . . . Where existing lease installations are converted for automatic custody transfer, some immediate savings will accrue to the pipeliner. With ability to maintain more constant load factors on significant portions of gathering systems, savings in horsepower requirements, and thus a reduction in pipeline pumping-unit sizes, is possible. More continuous pipeline pump operations under more constant load conditions should also reduce maintenance cost.

Existing gathering systems, originally designed for handling manual lease runs, will have greater usable capacity for handling increased production within certain sections. During extreme weather conditions, the costly and troublesome operations, delays, and even shutdowns that occur with manual batteries should be minimized with L.A.C.T.

Probably the most significant savings will be the elimination or reduction of evaporation from the lease measuring vessel during the time oil is entering the pipeline. This will most certainly be true for small dump-tank systems which are operated under pressure and require only short periods for filling and emptying, in which case the quantity actually received by the pipeline will more nearly equal the measured

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quantity than it does today with standard lease tanks and manually controlled runs. This also permits increased oil conservation. The following intangible benefits will also accrue:

1. A reduction in human errors both in tests and measurements.
2. Elimination of many disagreements between pumper and gager (thus improvement in human relations). This should also result in closer conformance with important legal and company policy factors by eliminating human tendency on the part of pumper and gager to adjust mismeasurements.
3. Reduction of recording errors.
4. Elimination of high tank bottoms.

It may well be that during the transitional period, pipeline investment will be necessary at individual leases with no significant offsetting operating-cost savings. Each case will depend upon operating conditions, lease location, and other related factors. Such nominal investments can be justified, however, if they are the first step toward eventual L.A.C.T. application at all or several leases within an operating area.

Gathering systems . . . As acceptance of L.A.C.T. systems increases, considerable investment and operating-cost savings should be possible in initially installed gathering systems. Line sizes can be smaller, thus conserving steel. Fewer tank connections are certain; and it may be that fewer lease connections will be necessary if we accept the statement that an L.A.C.T. battery may replace more than one manually operated battery as considered today.

In some instances it is entirely feasible that the custody-transfer automatic-measuring facilities installed on one lease could be used on an alternate programed basis to measure runs from several adjoining leases. This would reduce tankage required on such leases, increase the volume handled through the automatic facilities, and reduce the number of separate lease locations visited by the gager.

As regards lines and pumping units, size of both may decrease; but it is not yet clear whether a greater number of pumping units will be required. This is an area of conjecture depending upon what assumptions are made regarding operations, and also upon the agreed practical division of ownership of facilities between pipeliner and producer.

There is the possibility of a necessary change in concept as to what constitutes the gathering service, not only because of the pumping question and the possibility of making measurements and custody transfer at fewer leases, but also because of the change in total manpower requirements for operating leases and gathering systems and inspecting and maintaining L.A.C.T. systems and related facilities at the batteries themselves.

Acceptable systems . . . Properly installed and maintained instruments and devices available today can provide better "repeatability" and record properties and conditions at time of measurement than can be obtained manually. B.s. and w. monitoring devices have been proved accurate under continuous field-service conditions. Such monitoring as oil is produced into the lease tank assures only merchantable oil being delivered and retained in the measuring tank for acceptance by the pipeline. The periodic centrifuge testing of the representative sample taken from all runs will provide the proper deduction for b.s. and w.

What types of systems are likely to receive acceptance? The calibrated metering dump-tank system, consisting either of a converted lease tank or smaller vessel specifically designed for automatic operation, appears most promising for earliest major acceptance as evidenced by applications to date. It offers the best approach to checking results against manual methods at any selected time. Many improvements and simplifications have been and are now being made in such systems as compared to those reported in the recently published A.P.I. Bull. 2509-A.

One of the major questions involved in such systems is where the division of responsibility for providing certain measuring and sampling instruments, controls, and monitoring devices should be made for the producer and pipeliner. Experience will eventually furnish the answer.

P.D. meters . . . For many reasons, not the least of which is the prospect of eliminating errors caused by encrustations built up on the tank shell, positive-displacement meters are receiving greater attention. Quoting from the minutes of the August meeting of the A.P.I. committee on L.A.C.T., "It was generally agreed that the trend toward use of positive-displacement meters is given force by:

"1. The very good results reported so far from installations that have been properly made and maintained.

"2. The prospect of elimination of encrustation errors.

"3. The low cost of a meter installation.

"4. The prospect that close control over measurement accuracy can be retained by the pipeline company.

"5. The ease with which the cost of such an installation can be properly allocated between the producing and pipeline companies."

These points sound promising, but they also involve questions which bear examination. There are several factors which affect the accuracy of meter measurement. At terminals now measuring large volumes of crude oil on a continuous basis, positive-displacement meters are proving accurate within a tolerance of less than 0.1 per cent between meter provings. For lease-tank application, however, many of the favorable conditions available at terminals are not present. It is, therefore, debatable at this time as to whether L.A.C.T. systems involving accurate positive-displacement metering, with related instrumentation for determining quality and net quantity, monitoring for acceptable b.s and w. limits, and all on a completely "fail-safe" basis, can be made at costs comparable to dump-tank system costs.

These problems were also discussed at the recent L.A.C.T. committee meeting and it was generally agreed that a revised issue of A.P.I. Bull. 2509-A should include a complete and detailed discussion of the factors which govern the success, design, and operation of positive-displacement meter automatic-custody-transfer systems. Experience with various types of monitors may show that relatively simple velocity types will be acceptable. Fortunately, our company and others are interested and willing to participate in the installation and evaluation of any system which holds promise of improving measurement accuracy economically.

Conservation . . . Mr. Kelly's comments concerning the opportunities for a reduction in the loss of the lighter hydrocarbons are very interesting and may well represent the greatest resulting benefit from L.A.C.T., provided the pipelines and refineries are equipped to retain these lighter fractions when delivered to them. To my knowledge this is the first published indication of the possible magnitude and value of such conservation methods. Many producing companies are cognizant of its possibilities and both pipelines and refineries must evaluate how they can meet the problem. It appears to be a pure case of economics to consider whether the cost of handling the additional available volume is sufficiently less than its value delivered and processed.

Prefab Wall Makes Two Ponds of One

Cosden installs cooling-pond wall without shutting down cooling tower or draining existing pond. Small pond eases treating problem; large pond remains as reservoir.

by Larry Resen
District Editor

AN interesting plant problem had an equally interesting solution at Cosden Petroleum Corp.'s Big Spring, Tex., refinery.

The problem . . . A large cooling-tower pond was in use from which water would be pumped over the tower and into which the water from the tower would return. An excessive amount of water was stored in the pond since it is used as a reserve for fire and other emergency purposes. However, the size of the reservoir and the volume of water contained therein required an expensive treating procedure.

The decision was made to isolate the portion of the pond immediately surrounding the cooling tower. In this way only a limited amount of water would be circulated and need to be treated. The remainder would be available for makeup and fire. The specific problem was how to isolate this section of the pond without shutting down the unit served by the tower and without losing a considerable amount of water, a precious commodity in this West Texas area.

The solution . . . The decision to put in a wall around the tower to establish two separate ponds was simple. Doing it without pumping out the pond was something else. This roadblock was surmounted by use of precast concrete sections lowered into position with a crane, joined together with king-size U-bends, and sealed with an asphaltic compound.

The concrete sections have over-all dimensions of 6 by 6 ft. by 6 in. They were poured using two sections of 6 by 6 mesh for reinforcement. A U-shaped, 1-in. reinforcing bar was set in position at the top center of each section so that when the concrete hardened, the projecting portion of the bar would form a lifting lug. Salvaged sections of 1½-in. pipe were arranged in the form so they would extend completely through the section. These were also vertical and placed 5½ in. back from each side. The sleeves were flush with the top of the section.

However, a recess was provided at the bottom. This extended outward from the sleeve to each side of the section.

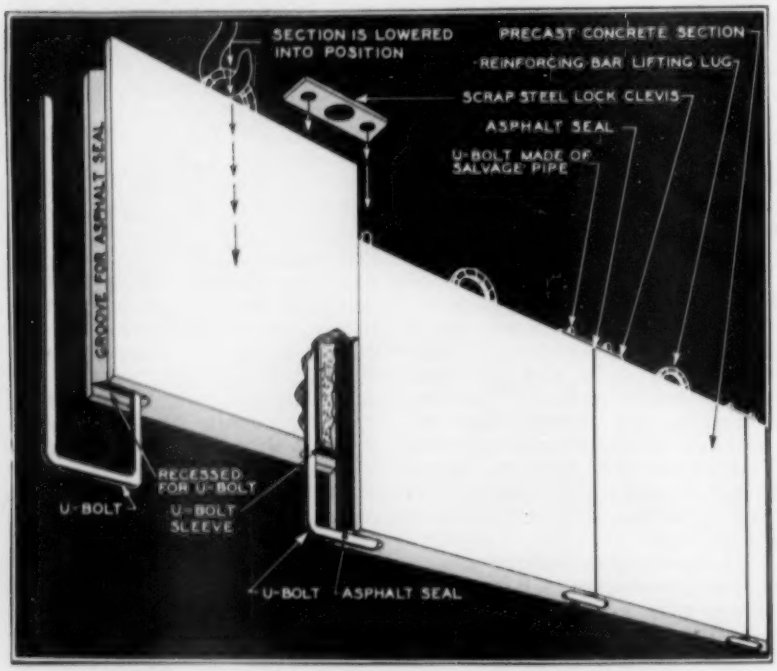
The sleeves and the recess were necessary, since they were required in the assembly of the wall. Each concrete section is held fast to the preceding and following section by means of U-bolt connectors. These are simply large-size U-bends made from 1-in. salvaged pipe. The base of the U is 11 in. across, matching the distance between sleeves in adjacent sections. The arms of the U are each 6 ft., 4 in. The sleeves of adjacent sections of concrete ride down over the arms of the U. The base of the U, meanwhile, is encased within the adjoining recesses at the bottom of each section, thereby not interfering with a smooth bottom edge.

Installation . . . In assembling the new wall, all of the sections were first precast. The bottom of the cooling-tower pond was then cleaned of foreign matter along the wall line. There was no effort made to get the bottom perfectly clean since the accumulated ooze is counted on as a seal in the project. Each section weighs about 3,000 lb., and the pressure exterted is expected to be enough to form a tight fit along the bottom.

The grooved sides of each section were coated with an asphalt emulsion, and then a fibered asphalt compound was applied to fill the grooves and cover the sides. This compound has a high percentage of asbestos filler. The emulsion was used to improve the bond between the filler and concrete. When the sections are in position and drawn tight, the filler serves as a watertight seal.

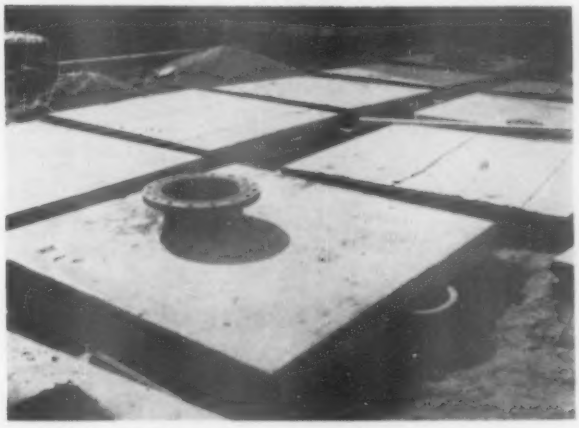
The first section to be lowered into position was secured to the existing retaining wall by means of an inverted U-bolt, one arm extending down through the sleeve and the other extending over the retaining wall. The following sections were added one at a time, with the U-bolts being in the normal position, the base being down and the arms up. Once a section had been placed into position, a locking clevis was used to hold it fast to the previously installed section.

The locking clevises were made up from scrap tank plate, and are simply



PRECAST CONCRETE SECTIONS were joined with U-bolts and sealed with an asphaltic compound, to make two cooling ponds of one, at Cosden's Big Spring, Tex., refinery.

Here's how prefab wall was built and installed . . .



1 ALL 19 SLABS were precast. U-shaped reinforcing bar was set in concrete to provide a lifting eye.

2 RECESS IN BOTTOM of section provides room for base of U-bolt. Heavy asphaltic material provided seal.

3 U-BOLTS extend through sleeves in each section. Next section will slide down over arm of exposed U-bolt.

4 FINISHED WALL provides effective dam in separating the two cooling-pond areas. Clevises hold sections firmly.

rectangular pieces of metal with a hole drilled near each end. The holes are on 11-in. centers to match the arms of the U-bolt. These clevises were slipped down over the arms of the U extending above the top surface of the wall, thereby connecting each section to the preceding one in a snug, secure fit.

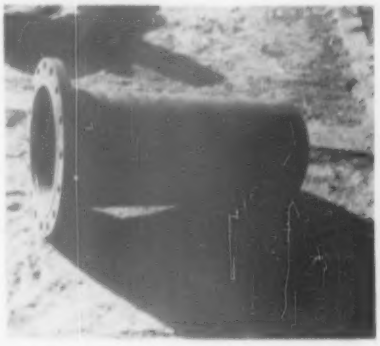
The installation of each section was a repetition of the preceding one. A float was used for a work platform on the pond and a portable crane for lifting the sections. A slight modification was necessary in the section used to make the one right angle in the new wall. However, all of the 19 sections used were essentially identical with but one exception.

There is a need for connecting the new isolated cooling-tower pond with the main water reservoir in time of emergency. One of the precast sections was therefore made up with a short length of 16-in. pipe extending through the section. A valve was attached to this 16-in. pipe with its handle extending up above the surface of the water. An additional length of 16-in. pipe was then attached to the valve with a short vertical leg welded at one end.

This leg rests on the bottom of the pond and eliminates any bearing action which would result were the valve unsupported, and which would tend to have an adverse effect on the wall. In an emergency, this valve would simply be opened and the water in the reservoir would be accessible to the fire mains drawing water from the cooling tower portion of the pond.

Acknowledgments

Cooperation of the management of Cosden Petroleum Corp. in release of this information and the assistance of E. B. McCormick, chief engineer, and Eb Bouillion, engineer, is hereby gratefully acknowledged.



BEARING ACTION of valve would tend to act on wall without this support. The leg rests on the bottom of the pond.

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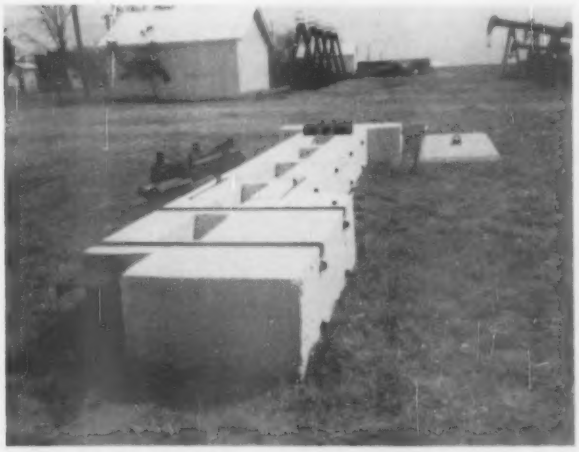

CONCRETE BASES such as this will accommodate several different size units because of the unique holddown feature. Fig. 1.

DRILL-PIPE section is precast longitudinally into the center of the base. This provides a means for clamping the unit. Fig. 2.

Phillips speeds foundation construction and . . .

New Portable Base Fits Any Type of Pumping Unit

by M. A. Remke

MOST all operators have experienced the pressure placed on them—to get that well on the pump. The pumping unit is on its way to the well, but there is no foundation ready and it is not advisable to pour a foundation until a set of certified prints are available from the manufacturer.

Therefore it is necessary to wait until prints arrive or until the pumping unit is on location so measurements can be made for the proper foundation-bolt spacing. A courageous individual will use an old print and hope the bolt spacing is correct, but a simple way to set that unit with assurance it will fit on the foundation is certainly desirable.

The answer . . . Portable multiunit concrete pumping-unit bases solve this problem. Foundations similar to that shown in Fig. 1 are available in several different sizes. One base will accommodate several different size pumping units. Furthermore, the base will accommodate units in that size range from several different manufacturers because of the unique holddown feature.

Units are secured to the base with a center rail and U-bolt clamp, rather than bolted on with foundation bolts. Therefore, it is possible to make these bases available as a store-stock item which can be drawn upon for immediate installation. This feature alone will solve one of the major bottlenecks in placing a pumping well in operation.

Since the base is fully portable, it can be moved from an abandoned location to a new location. The result is a considerable saving in investment cost.

How they're made . . . The base is of prestressed reinforced construction poured with the lightweight aggregate. The main longitudinal reinforcing consists of high-tensile-strength pretensioned cable and the lateral bars are post tensioned to provide the small amount of lateral reinforcing necessary. Fig. 2 shows how a section of drill pipe is precast longitudinally into the center of the base. This provides a means for clamping the unit to the base.

Rails for the universal prime-mover end are imbedded in the concrete, flush with the surface. Thus, the base is entirely clean on the surface, simplifying the manufacturing process. This provides a better surface on which to set the unit. Tar paper is used as a cushion for setting the unit. This eliminates the need for grouting.

The universal prime-mover end feature is an advantage to Phillips' operations. Many times it is desirable to set a unit on a well in an electrified area and pump it a few days before electric power can be provided. It is a simple matter to set a gas engine on the foundation and start pumping the well prior to the time electric power is available. Longitudinal slotted slide rails are used for prime movers which do not require flywheel clearance. A special concrete subbase is available for installation of engines which require flywheel clearance.

Any prime mover . . . Prime movers may be mounted on the same installation as illustrated in Figs. 3 and 4. Fig. 3 shows a typical installation at a 1956 extension well in the North Burbank unit water-flood project. Before complete electrification could be provided, it was desirable to produce this well.

A gas engine was placed on this early producer, but will be replaced with an electric motor when power lines are constructed. Result—a permanent in-

Author is production engineer, Phillips Petroleum Co., Bartlesville, Okla.

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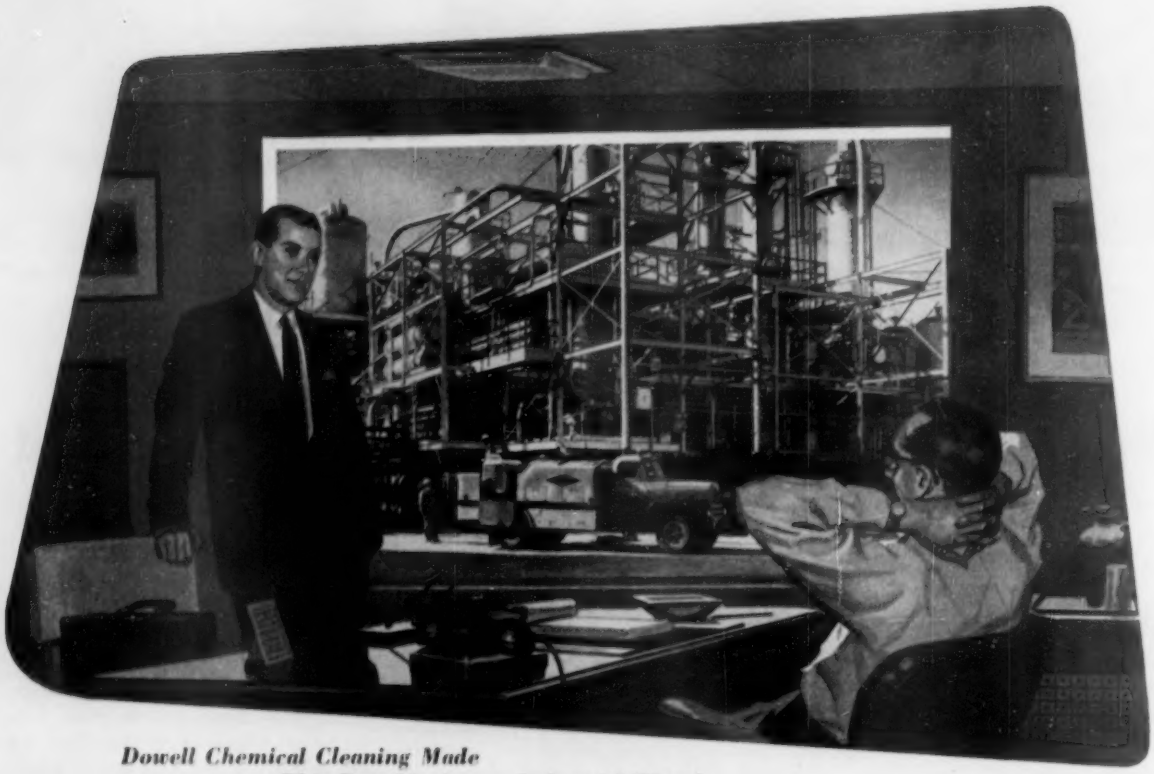

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TYPICAL INSTALLATION of a prime mover is shown here with a gas engine for power before electricity was available. Fig. 3.

PERMANENT INSTALLATION was made when electricity was made available. Base may be set in any terrain. Fig. 4.

stallation exactly like that in Fig. 4.

Phillips was instrumental in developing the portable pumping-unit base for the larger pumping units. The first portable base was installed on a Phillips' well early in 1955 and since then over 350 installations have been made. A major portion of Phillips' installations have used portable bases during this period.

The base may be set in any terrain from sand hills to rock. Lateral concrete sills are available which may be added to the base as the individual requirement demands. It has been found that an extra sill is particularly advantageous under the engine end if a single-cylinder two-cycle gas engine is used operating at high speed. In soft terrain, a sill under the front of the unit is advantageous.

It's truck bed high . . .

Mud-storage house saves labor

JOHN DRILLING CO. of Fort Worth has its mud house mounted on skids at mud-tank level and also at truck level. Mud can be unloaded into the house and then directly to the mud-mixing hopper near the rig.

The frame which supports the house also makes a neat compartment for loose joints of pipe to be used around the rig.

Visible reservoir gives pumper accurate gage

HERE is a way to insure polished-rod lubrication at all times. With this transparent pot the pumper's attention is directed to the oil level immediately to remind him of adding oil. Where it might be easy to forget to check the level of the oil in a steel-walled container, the pumper can't miss the oil supply here.

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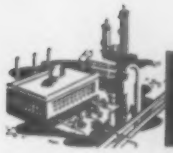


JOB IMPROVEMENT FOR THE PROCESS FOREMAN—72

How to Control Tower Flooding Effectively

LIQUID level in the downspout can rise because:

1. Vapor velocity increases, thus causing a higher pressure drop through the caps and consequently higher back pressure on the downspout.

2. Liquid downflow increases, thus causing a higher liquid level on each tray and a higher pressure drop through the downspout.

When the liquid level reaches the top of the downspout (due to high liquid and/or vapor loading), the tray will begin to flood. Liquid builds up above the bubble caps on the flooding tray and enters the risers on the tray above.

Flooding is an extremely unstable condition and can be caused by a very small increase in tower loading. When the liquid builds up above the bubble caps, the pressure drop through that tray increases and consequently the back pressure on the downspout increases.

Liquid buildup . . . This causes further liquid buildup on the tray above and greater pressure drop occurs which further aggravates the condition. All the trays above the flooding tray will progressively flood and eventually liquid will be carried overhead in slugs (puking).

When liquid is being carried overhead, the addition of reflux will have no effect on the efficiency of fractionation or on tower temperatures. Since the downspouts are full of liquid, additional reflux pumped back to the top tray cannot descend to the next tray, but will be carried overhead in the vapor line.

Tower flooding results in poor fractionation. This is primarily due to the slugging of liquid overhead and the temperature and pressure surges experienced throughout the tower.

This material is taken from "Fundamentals of Refining," operating manual of Magnolia Petroleum Co. refining division, Beaumont, Tex.

Causes and control . . . Flooding is caused by excessive liquid and/or vapor rates inside the tower. Flow rates which cause flooding may be too high because the design capacity of the bubble tray has been surpassed or because mechanically the tray is not functioning properly. Some of the common mechanical causes of flooding are:

1. Scale deposits, especially between the risers and the bubble caps.
2. Obstructions in the downspouts, such as bubble caps which may have blown off a tray and become lodged in the downspout.
3. Mechanical failure, such as a tray or part of a tray falling down on the tray below.
4. Concentration of water on the trays, particularly where the tower top and bottom temperatures are such that removal of water in a product stream is hindered.

Tower flooding is controlled by reducing the vapor and liquid loading in the tower. This is usually accomplished by lowering the reflux rate, allowing the excess liquid to be removed in the overhead or bottoms products. Finally, it is accomplished by readjusting the reflux rate for a stable operating condition. In some cases, it may be necessary to reduce the feed rate and temperatures.

Changes in tray design can sometimes be made which will increase nonflooding capacity of a bubble tray. Several of these changes in design are listed below:

1. Replacement of existing trays by higher capacity trays, such as cascade type of tray.
2. Installation of additional downspout area in the bubble trays.
3. Notching or cutting down the overflow weir.
4. Increase in length of the overflow weir by zigzag pattern.
5. Removal of the bottom section of the downspout.
6. Removal of every other tray and installation of longer downspouts.

Ineffective control . . . If tower operating conditions are incorrect, the result will be offtest products or low yield of the desired product. It is, therefore, necessary first to select the ideal pressure, temperatures, and flow rates for a given separation and, second, to minimize product degradation by early recognition of improper tower control.

Processing difficulties will be discussed and illustrated by performance of various towers in the refinery.

The selection of tower top and bottoms temperatures has been previously discussed. Careful control of these conditions is necessary to obtain maximum yield of a specification product. Two examples of how improper temperature control can impair unit operation are cited here:

1. Braun Depropanizer—designed to take an overhead propane product containing a minimum percentage of butanes. An increase in this percentage means diversion of butanes from the alkylation unit to the polyform unit and a cut in refinery profits.

	Good operation	Poor operation
Top temperature, °F.	125	138
Overhead composition:		
Propylene	38.9	25.9
Propane	46.3	44.0
Total butanes	5.4	23.6
Total pentanes	0.4	3.3

2. Polyform unit depropanizer—improper control can result in unit shutdown.

	Good operation	Poor operation
Top temperature, °F.	140-145	165-170
Result	Good BB recovery	Polymerization furnace cokes off

Perfect Results with MARTIN PLUNGERS everytime . . .

Like any precision instrument or tool, there is a proper technique for the use of Martin Plungers.

1

Proper Plunger Length

The deeper the well the longer the plunger required. Three rings per 100 ft. for the 1¼" and smaller diameters, and two rings for the larger diameters, is simple rule to follow. Add extra length for stroke-thru.

2

Proper Ring Size

Gravity, Temperature and water content determine the ring size to give free travel with minimum slippage. There is no reason to have a stuck plunger, or too loose a fit. You can have any desired fit by steps of .005".

3

Proper Pre-swelling

Why run Martin Split Rings dry, when pre-swelling will get much better results? Even lube oil or grease will tighten them in the grooves, and when rolled down and tight you are assured of trouble free operation.

Complete, detailed instructions for using Martin Plungers are given simply and quickly in John N. Martin Catalog No. 4. All guess work is eliminated. You obtain proper ring size for a correct working fit, proper plunger length for your particular well, and proper pre-swelling of rings. *It's a fact: — you have perfect results with Martin Plungers everytime — regardless of water or sand conditions — when you follow the simple instructions in John N. Martin Catalog No. 4. Write for it today.*

MARTIN PLUNGERS ARE SOLD THRU SUPPLY COMPANIES

JOHN N. MARTIN

Manufacturer

9 W. BRADY • TULSA, OKLA.

ROCK-BIT DESIGN, SELECTION, AND EVALUATION—10

What Hardfacing Can Do for Rock-Bit Teeth

by H. G. Bentson

THE application of tungsten carbide materials to the gage and teeth surfaces is obviously performed for the purpose of obtaining optimum resistance to abrasive wear. Without this facing, all bits would quickly lose gage and the teeth on most types would rapidly become dull or blunt.

Because of these circumstances, hardfacing materials are applied to the gage surfaces of all roller rock bits, but not necessarily to the teeth of all types of bits.

The characteristics of the formation to be drilled determine the degree to which rock-bit teeth are faced. This degree may range from the omission of any facing, to applications on all four surfaces of the teeth. Generally, at least one side of each of the teeth of a hardfaced bit has the facing applied over its full area. Application on one side only permits the softer carburized surface of the opposing side to wear away faster and develop a self-sharpening effect.

Self-sharpening . . . Since tooth crests are relatively thin on a new bit, the self-sharpening effect obtained by facing one side only may not be effective until the tooth is partially worn.

Under these conditions additional tooth life can be gained by facing the opposing side for a short distance from the crest toward the tooth root. Facing the teeth in this manner reduces the initial rate of wear. The crest width does not become excessive until the tooth is worn beyond the tipped surface.

When the wear has progressed to this point, the facing on the completely faced side creates the desirable self-sharpening effect.

For certain bits the additional application of tungsten carbide to the ends of the teeth is required to prevent accelerated wear of these surfaces. In the absence of facing, wear on these areas reduces the effective bottom-hole coverage. This, in turn, permits the development of a ring of uncut formation on the bottom of the hole on which the bit would ride. Under such conditions a reduction in peneration rate and a shortened bit life would be expected.

Double facing . . . Full-length hardfacing is sometimes applied to all four faces of the teeth. Usually, bits with this type of facing are those which are used in soft formations containing an appreciable amount of abrasive materials.

Since the self-sharpening effect is retarded by the double facing, these bits should be used in formations sufficiently low in compressive strength to permit adequate penetration by the teeth if they become flat and blunt.

In certain formations facing on the teeth has proved more detrimental than beneficial. Due to its brittleness, the facing material will flake off under the impact loads usually encountered in the drilling of hard formations. As a result, this flaking often causes accelerated fracturing and chipping of the hardened surfaces of the teeth and subsequent reduction in tooth life. For this reason teeth on specific types of hard-formation bits are not faced.

Author is chief sales engineer, H. C. Smith Tool Co., Compton, Calif.

Formation Determines Bit Choice

The previous discussion has analyzed each of the factors relating to fundamental rock-bit design. The application of these factors to specific types is further complicated, however, by the variety of types required.

Variety of types . . . The number of rock bits currently required in relation to the drillability of the most common formations is indicated by the designation letters shown in Fig. 17. These fictitious types of designations have been affixed to provide a means of identification with respect to familiar bit type of terminology used by several bit manufacturers.

Note that each of the general types of bits has been designed for use in a given formation classification. For example, Type A bit is designed to drill soft formations having low compressive strength. But the Type E bit is designed to drill medium-hard formations. Under various conditions, however, most of these types of bits can be advantageously used in formations for which they were not necessarily designed.

Operating limitations and downhole conditions very often dictate these variations in selection.

The need for such a large number of types of bits may not always be readily apparent. However, an analysis of the formation types of bits shown in the table provides justification for the necessity of such a large selection.

Since many of the formations encountered are not homogeneous, sizable variations exist in their drillability or in the ease with which they can be drilled. For example, a soft homogeneous formation required the use of a specific bit in order to obtain the best performance.

If this same formation is interspersed with streaks which are considerably harder, the drillability of these harder streaks may require the use of a different type of bit. Likewise, a homogeneous hard formation would require the use of a specific type of bit; whereas the same formation separated by softer

layers would dictate the use of a softer type of bit.

Providing for streaks . . . It is evident from this that some types of bits must not only be designed for use in specific homogenous formations, but must also incorporate compromise features which permit at least a reasonable rate of penetration through softer or harder streaks.

If formations consisted of nothing but thick sections of homogeneous materials, a reduction in the number of types of bits might be justified. Unfortunately, areas where these conditions are encountered are somewhat limited.

The fact that rock bits cannot always be used under optimum conditions adds further to the necessity for having a large number of types of bits available. Variation in downhole conditions and operating limitations very often requires the use of different types of bits although the desirability of the formations may be nearly alike.

Crooked-hole problems, for example, usually necessitates the use of lighter bit weights and greater rotary speed. Under these conditions a variation in types of bits may be required from that for the same formation under which conditions would permit heavier weight and lower rotary speed.

Likewise, weight or rotary speed limitations imposed by other factors would have a similar effect on the type of bit required. Based upon these considerations, the necessity of variations in design to drill formations effectively under varying conditions is apparent.

The variety of types of bits currently manufactured, however, appears to furnish an adequate selection for drilling most of the formations under most of the operating conditions. Although increased performance could be obtained in isolated cases by additional types of bits, these special designs would be so restricted in use as to make them impractical.

AFFIXED TYPE DESIGNATION	ROCK BIT MAKE, DESIGN, AND TYPE DESIGNATION												FORMATION TYPES (Combined from information contained in each of the manufacturers catalogs)
	H. C. SMITH		HUGHES		CHICAGO PNEUM.	SECURITY	GLOBE			REED			
	3 CONE	CROSS SECTION	TRI-CONE	TWO CONE	3 CONE	3 CUTTER	3 CONE	CROSS SECTION	2 CONE	3 CONE	CROSS SECTION	2 CONE	
A	3C-DT	DDT	OSC-3	LW-3	ES-1C	S3	SS3C	SS4C	SS2C	YT-3	2LT LT-3	B2	Soft formations having low compressive strength and high drillability (sticky shales, clays, red beds, salt, soft limestone, unconsolidated formations, etc.)
B	3C-DT2	K2	OSC-1 OSC-1G	LW-1	ES-1	S4	S3C	S4C	S2C	YT-1	2LM LT	B1	Soft to medium formations or soft interspersed with harder streaks (firm, unconsolidated, or sandy shales, red beds, salt, anhydrite, soft limestone, etc.)
C	3C-K2P	K2P	OSC	LW-1	ES-2 ES-3	S6	M3C	M4C	M2C	YT	T 2T		Soft to medium formations interspersed with hard streaks (medium hard and unconsolidated shales, red beds, chalk, salt, anhydrite, gypsum, medium hard limestones, unconsolidated sands, etc.)
D	3C-SV2	K2P	OWV	LW	EM-1V	M4N				YS-1			Medium to medium hard formations (harder shales, sandy shales, shales alternating with streaks of sand and limestone, etc.)
E	3C-2	C2K	OW	LW		M4	MH3C	MH4C	MH2C	YS	2HM		Medium hard formations (hard tough shale, sandy shale, hard limestone, anhydrite, dolomite, hard rock interbedded with tough shale, etc.)
F	3C-2	C2K	OWS	LW	EM-3	M5	MH3C	MH4C	MH2C		2H		Medium abrasive to hard nonabrasive (hard shale, hard lime, hard anhydrite, dolomite, chalk, slate, hard rock interbedded with tough shale, etc.)
G	3C-T2	C2K	OWC		EH-1	M4L	MHT3C			YM	2HS-1 2HS-1W		Medium hard abrasive to hard formation (high compressive strength rock, dolomite, hard limestone, hard slaty shale, chert streaks, etc.)
H	3C-4	4	W7		EH-1	H7			H2C	YH	2C		Hard semi-abrasive formations (hard sandy or chert bearing limestone, dolomite, granite, chert, abrasive sand, etc.)
J	3C-4W	4W	W7R		EH-2 EH-3	H7W				YH W	2C W 2C WW		Hard abrasive formations (chert, quartzite, pyrite, granite, hard sand rock, etc.)
K			R-1			H9					DMQ Cobra		Extremely hard, abrasive formations (chert, quartzite, granite, flint, novaculite, taconite, basalt, quartzitic sand, etc.)

CLASSIFICATION of types of bits in relation to drillability of formations using several manufacturers' terminology. This does not include types of bits of all manufacturers. Fig. 17.

by D. K. Taylor

NATURAL-GAS DESULFURIZATION—4

Iron-Sponge Desulfurization Gains Popularity

THIS light grade sponge is compressed much more than the heavier grades; concentration is approximately 7 lb. of Fe_2O_3 per cubic foot of bed.

We believe that the over-all best material, giving the most economic operation is the 9-lb. grade.

Hoosier experience . . . In 1940, Hoosier Gas Corp., at Vincennes, Ind., installed one of the liquid-purification plants to purify some local sour gas. When this plant was put on the line they had 300 complaints the first day—and for a company of only 11,000 customers, this was considered pretty high.

Upon inspection of their gas, it was discovered that while the liquid-purification plant had taken out most of the H_2S, almost 1.2 grains of mercaptan sulfur was present.

It was necessary that this local gas be used for peak shaving purposes during the winter months; and, therefore, the company put into service a tower containing iron sponge with the hope that it might reduce the organic sulfur compounds.

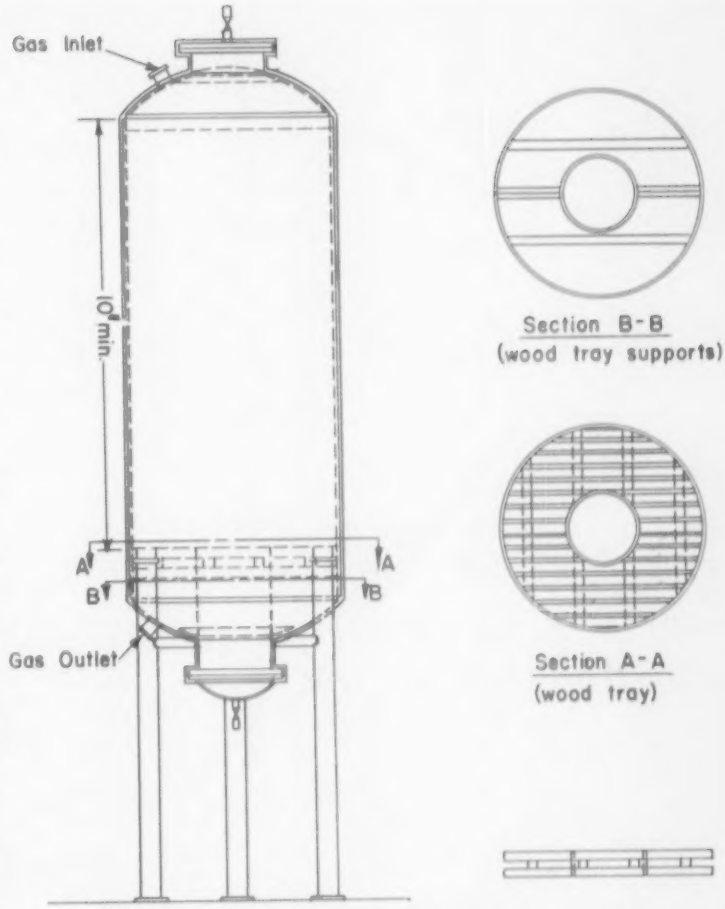
An air compressor was obtained and 2 per cent of air was blended into the gas ahead of the purifier. Apparently this small amount of oxygen, in the presence of the alkaline iron oxide, destroyed the mercaptans. Approximately half of the total sulfur was absorbed by the sponge.

The Institute of Gas Technology, at Chicago, analyzed samples of the inlet and outlet gas and estimated that the residual sulfur was there in the form of disulfides or other non-odoriferous compounds. Thus it was possible to use this gas for public utility distribution.

There are many new petrochemical processes being developed where expensive catalysts are employed. In such cases, gas supplied to these processes should have the lowest sulfur content possible. The development of the new methylene blue test, by the Bureau of Mines, and the operation of the Louisiana, Mo., demonstration plant, where a combination of iron sponge to remove the H_2S, and activated carbon to remove the organic sulfur,[1] were used, indicates that the iron-sponge method is a feasible way to get the total sulfur content down below the 0.01 grain per hundred cubic feet level.

There are twenty or more of this type of purifier using these principles in service today.

Author is western division manager, Connelly, Inc. Paper presented at Gas Conditioning Conference, University of Oklahoma.



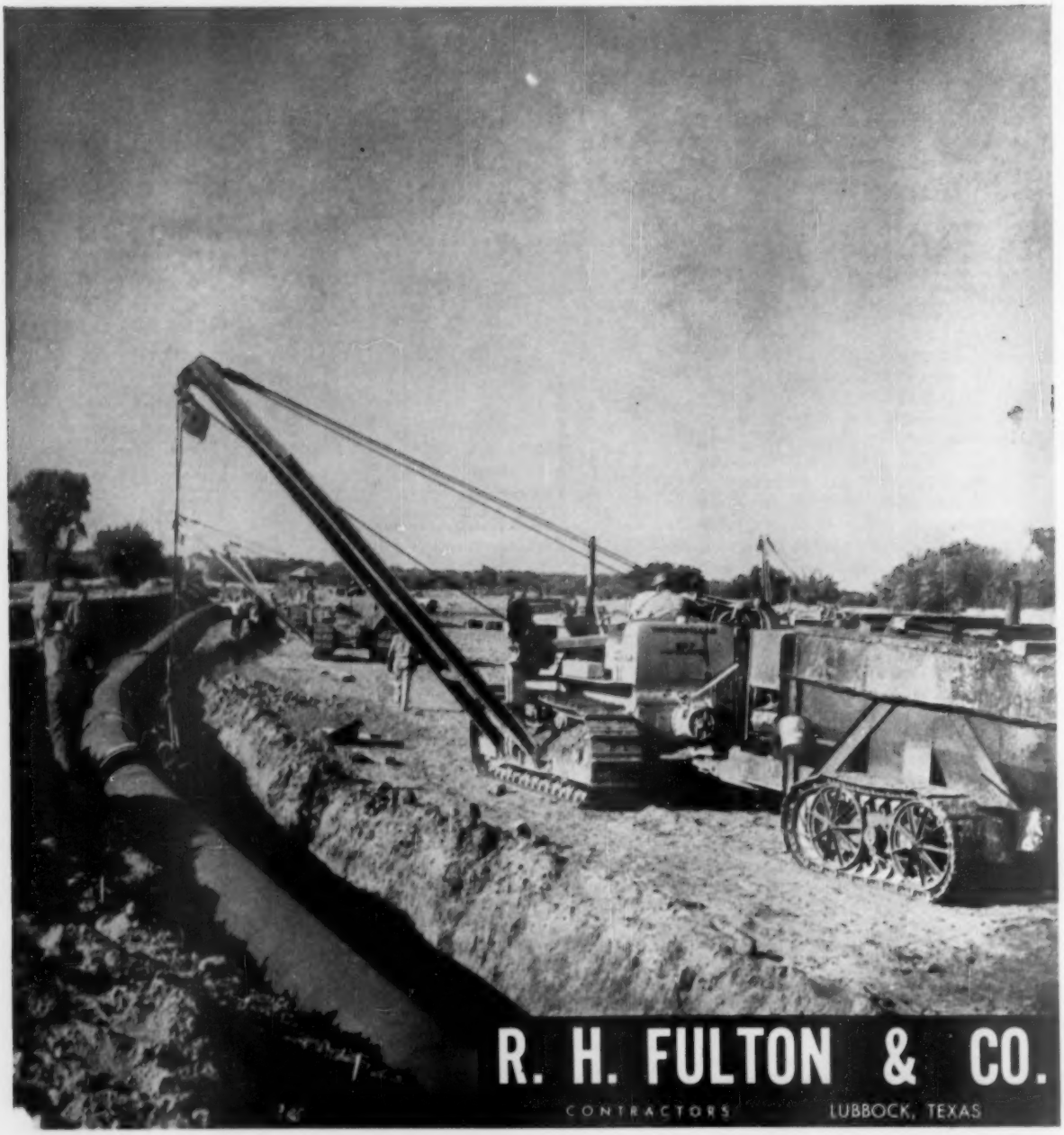
HIGH-PRESSURE PURIFIER with wood-tray sponge support.

Reference

1. Wenzel, et al, Ind. Eng. Chem., Vol. 46, p. 858, May 1954.

PIPELINES

ACROSS THE CONTINENT . . .



Pipeline Patrol

. . . Report on Construction

Under Way, Contracted, and Planned

PIPELINE activity reported here is compiled from surveys conducted by The Oil and Gas Journal among pipeline companies and contracting firms. Projects listed include those proposed, contracted, and under way. Uncontracted projects are indicated by • preceding the project.

Crude-Oil Pipelines

Fulton, R. H. & Co., Lubbock, Tex.
Project: 39 miles of 6-in. from Donkey Creek field in northeastern Wyoming, southeast to the Osage pump station in Weston County.
Status: Fulton, a contractor has applied to Wyoming Public Service Commission. Application competes with that of Powder River Pipeline Co.

Humble Pipe Line Co.
Project: 94 miles of 18-in. from Ector County to Kemper County, Texas.
Status: Planned.
Contractor: **Lone Star Construction Co.**
Completion: February 1, 1957.

• **Interstate Oil Pipe Line Co.**
Project: 5 miles of 4-in. from South Bosco field, Louisiana, to present main line, and 5 miles of various size from Church Point field, Louisiana, to present main line.
Status: Proposed.
Project: 5 miles of 8-in. from McKamie Station to Magnolia Station, Arkansas.
Status: Under way.
Contractor: **J. C. Moore Construction Co.**

• **Northwest Pipeline Corp.** (an affiliate of Pacific Northwest)
Project 80 miles of 8-in. and 300 miles of 10-in. crude and products line from Four Corners area to Salt Lake City.
Status: To start May 1957.
Completion: August 1957.

• **Offshore Gathering Corp.,** Houston.
Project: 364 miles of mostly 20-in. in Gulf of Mexico off Louisiana.
Status: Proposed.

• **Ohio Oil Co.**
Project: 504 miles of 8-in. from Teutopolis, Ill., to Spitzmesser, Ind.
Contractor: **O. R. Burden Construction Corp.,** F. W. Lewis, spread superintendent with office at Sheridan, Ind.; P. E. Thibodaux, spread superintendent with office at Rockville, Ind.
Project: 34 miles of 6-in. from Murphy Dome to Bonanza, in Big Horn basin, Wyoming, to connect with existing line there.
Status: Planned.

• **Pasotex Pipe Line Co.**
Project: 127 miles of 20-in. along its route from Wink to El Paso, retiring another dual 8-in. section.
Status: Planned.
Completion: July 31, 1957.

• **Powder River Pipeline Co.,** Fratt Building, Billings, Mont.
Project: 20 miles of 6-in. from Donkey Creek field near Moorcroft, Wyo., to Butte Pipe Line Co.'s line. (See Fulton, R. H. & Co., above.)
Status: Planned.

Service Pipe Line Co.
Project: 30 miles of 3, 4, 6-in. to connect 16 new leases in Antelope, Charlson, Sanish, and Blue Buttes pool in McKenzie County, North Dakota, to its present gathering system.
Status: Under way.
Contractor: **Oil Field Services, Inc.**
Completion: Late 1956.
Project: 5 miles of 12-in. near El Dorado, Ark.
Contractor: **O. R. Burden Construction Corp.,** R. M. Jones, spread superintendent, office at El Dorado.

• **Sinclair Pipeline Co.**
Project: 150 miles of 20-in. from Teague, Tex., to Houston.
Status: Planned.
Completion: 1957.

• **Tecumseh Pipe Line System** (Joint venture of Sinclair Pipe Line, Ashland Oil & Refining, and Pure Oil Co.)
Project: 190 miles of 20-in. between Griffith, Ind., and Cygnet, Ohio. Joint project with **Sinclair Refining Co., Pure Oil Co., Ashland Oil & Refining Co.**
Status: Awaiting pipe.
Completion: September 1957.

• **Union Oil Co. of California.**
Project: 225 miles of 16-in. from San Joaquin Valley to its refinery at Oleum, Calif.
Status: To start December 1, 1956.
Completion: Late 1957.

Products Pipelines

• **American Pipe Line Co.**
Project: Line from Gulf Coast to New York City area. Received ODM approval to amortize 40 per cent of $175,000,000 cost with a rapid writeoff.
Status: Planned.

• **El Paso Natural Gas Co.**
Project: 11 miles of 4-in. L.P.G. products from Snyder Line to South Andrews Plant, Texas.
Status: Planned.
Project: 80 miles of 8-in. and 300 miles of 10-in. products and crude line from Four Corners area to Salt Lake City.
Status: Planned.
Completion: August 1957.

• **Gulf Refining Co.**
Project: 530 miles of 10-in. L.P.G. and natural gasoline line from Waddell Plant in Crane County, Texas, to Mont Belview near Houston (368 miles is conversion from crude service).
Status: Under way.
Contractor: **Panama-Williams Corp.** has 46 miles from Waddell Plant to Midland. Remainder not let.

• **Northwest Pipeline Corp.** (an affiliate of Pacific Northwest)
Project: 80 miles of 8-in. and 300 miles of 10-in. products and crude line from Four Corners area to Salt Lake City.
Status: To start May 1957.
Completion: August 1957.

• **Ohio Oil Co.**
Project: 350-miles of 12-in. from Wood Rivier, Ill. to Chicato.
Status: Planned. Starting date depends on pipe delivery, which may not be completed until 1958.

Phillips Petroleum Co.
Project: 66 miles of 12-in. from Borger, Tex., to Cassoday, Kan.

WHAT WILL YOUR PIPE LINES LOOK LIKE 10 YEARS FROM NOW ?

In case after case, lines protected with TAPECOAT have been dug up after more than 10 years of service *with no signs of deterioration on the pipe surfaces uncovered.* That's why TAPECOAT coal tar coating is specified by those who realize that continuing protection is the *first* consideration.

Since 1941, this quality coal tar coating in handy tape form has demonstrated its ability to withstand corrosion year after year, above and below ground, on pipe, pipe joints, couplings and other vulnerable surfaces.

Why gamble with "unknown" protection? By using TAPECOAT, you'll be sure to have the quality protection you need for long service life without costly maintenance and replacement.

Write for brochure and prices

The TAPECOAT® *Company*

Originators of Coal Tar Coating in Tape Form

1539 Lyons Street
Evanston, Illinois

Pipeline Patrol

Status: Work started late October 1956.
Contractor: **Vedal Construction Co.**

• **Phillips Pipe Line Co.**
Project: 135 miles of 12-in. looping between Borger, Tex., and St. Louis.
Completion: December 31, 1956.

Plantation Pipe Line Co.
Project: 327 miles of 18-in. from Baton Rouge, La., to Helena, Ala.
Status: Under way.
Contractor: **Oklahoma Pipe Line Constructors;** N. L. Arie, spread man, office at Baton Rouge.
Completion, December 1956.

• **Pure Transportation Co.**
Project: 8 miles of 10-in. from Smiths Bluff to Port Arthur Station of Evangeline Pipe Line System.
Status: To start December 1, 1956.
Completion: January 15, 1957.

Shell Oil Co., Pipe Line Dept.
Project: 16 miles of 4-in. gasoline line from Wilmington, Calif., refinery to Los Angeles marketing depot.
Status: Under way.
Contractor: **Ledford Brothers.**
Completion: January 1, 1957.

• **Sioux Oil Co.**
Project: 80 miles of 4-in. from its Newcastle, Wyo., refinery to Rapid City, S. D.
Status: Planned.
Completion: Late 1956.

• **Southern Pacific Pipe Lines, Inc.**
Project: 300 miles of 6, 8, 10-in. to span the Sierras and connect San Francisco with Reno and Fallon, Nev., and to serve the Sacramento Valley.
Status: Planned.
Completion: August 1, 1957.

• **Union Oil Co. of California**
Project: 815-mile line from Rifle, Colo., to Los Angeles refining area, to carry products from its proposed Rifle shale-oil plant.
Status: Proposed.

Non-Petroleum Pipelines

American Gilsonite Co.
Project: 70 miles of 6-in. from Bonanza, Utah, to Grand Junction, Colo., to carry slurry of gilsonite from mines to refinery now being built.
Status: Under way.
Contractor: **Engineers Limited Pipe Line Co.**
Completion: Late 1956.

Dow Chemical Co.
Project: 16 miles of 4-8-in. brine lines.
Contractor: **Shamrock Construction Co.**
Completion: December 1956.

Natural-Gas Pipelines

• **Arkansas Louisiana Gas Co.**
Project: Line from Texas-Louisiana coastal region to northern Louisiana, to connect with their present system.
Status: Long-range plans.

• **Carolina Pipeline Co.**
Project: Distribution lines to serve 14 cities in Central South Carolina. Will buy gas from Transcontinental Gas Pipeline Co. or Southern Natural Gas Co.
Status: Has received South Carolina Public Service Commission permit.

• **Cities Service Pipe Line Co.**
Project: 27 miles of 6-in. from Lake Charles, La., to Orange, Tex.
Status: Planned.
Completion: April 30, 1957.

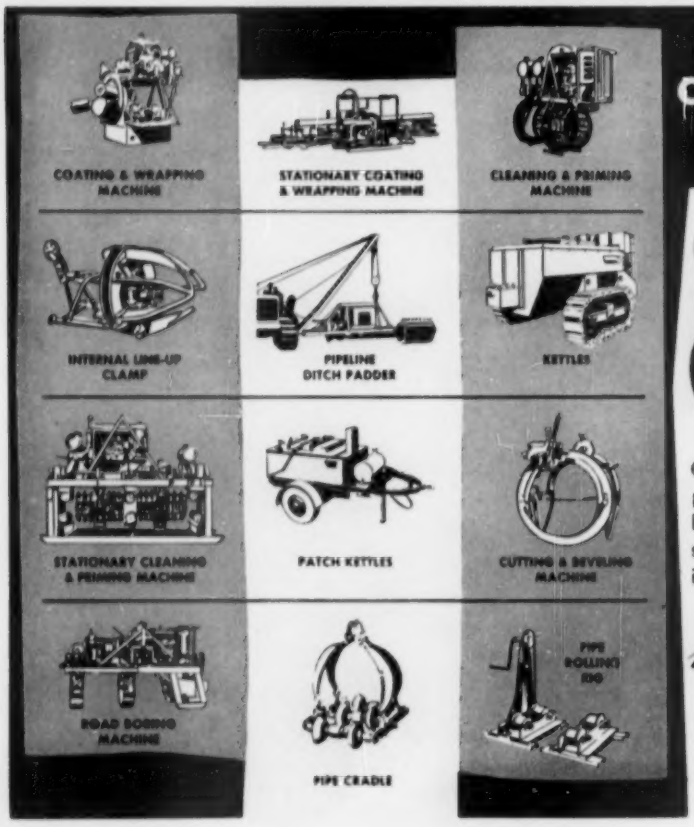
• **Coastal Transmission Corp.**
Project: 565 miles of 26-in. from McAllen, Tex., to Baton Rouge, to deliver to Houston Texas Gas & Oil Corp.'s proposed line to Florida. Also 272 miles of smaller gathering lines.
Status: Seeks FPC permit.

• **Colonial Natural Gas Corp.**
Project: Two systems; one between Houston-Lake Charles area and Miami, Fla.; one in the Carolinas and Georgia.
Status: Proposed.

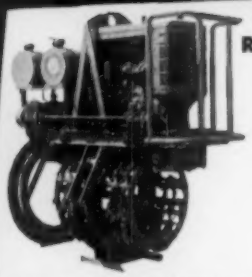
• **Colorado Interstate Gas Co.**
Project: 238 miles of 22-in. from Laramie to Green River, Wyo. (last part of a 374-mile line between Denver and Rock Springs).
Status: Under way.
Contractor: **R. H. Fulton.**
Completion: January 1957.
Project: 1957 program . . . 66 miles of 30-in., 40 miles of 34-in., 109 miles of 26-in., and 100 miles of 24-in. from Springfield, Colo., to Pueblo, Colo; 345 miles of 30-in. from Kit Carson, Colo., to Beatrice, Neb.; 50 miles of 22-in. from Laverne to Hooker, Okla.; 24 miles of 22-in. Panhandle field looping.
Status: Pending FPC approval.

Commonwealth Natural Gas Corp.
Project: 40 miles of 18-in. looping from Gum Springs to Chester, Va.
Status: Under way.
Contractor: **Pipeline Maintenance & Construction Co.**
Completion: January 15, 1957.

• **El Paso Natural Gas Co.**
Project: 193 miles of 34-in. between San Juan basin and Topock, Ariz., and 38 miles of 20-in. between San Juan mainline and Phoenix.
Status: Under way.
Contractor: Doing own construction.
Completion: February 1, 1957.
Project: 146 miles of 34-in. between San Juan basin and Topock.
Contractor: **Western Pipeline, Inc.**
Completion: February 1, 1957.
Project: 29 miles of 30-in. from Lindrith Station to Chaco Plant, New Mexico.
Status: Planned.



CROSE LINE-TRAVELING CLEANING AND PRIMING MACHINE



RUGGEDLY BUILT YET LIGHT WEIGHT.
Also can be used with stationary base for yard work. Handles pipe up to 36".

Counter rotating heads assure faster cleaning and priming . . . prevent pipe from turning and give better cleaning job. These Crose machines are specifically designed for faster, trouble-free service on the line.

M. J. Crose Manufacturing Company, Inc.

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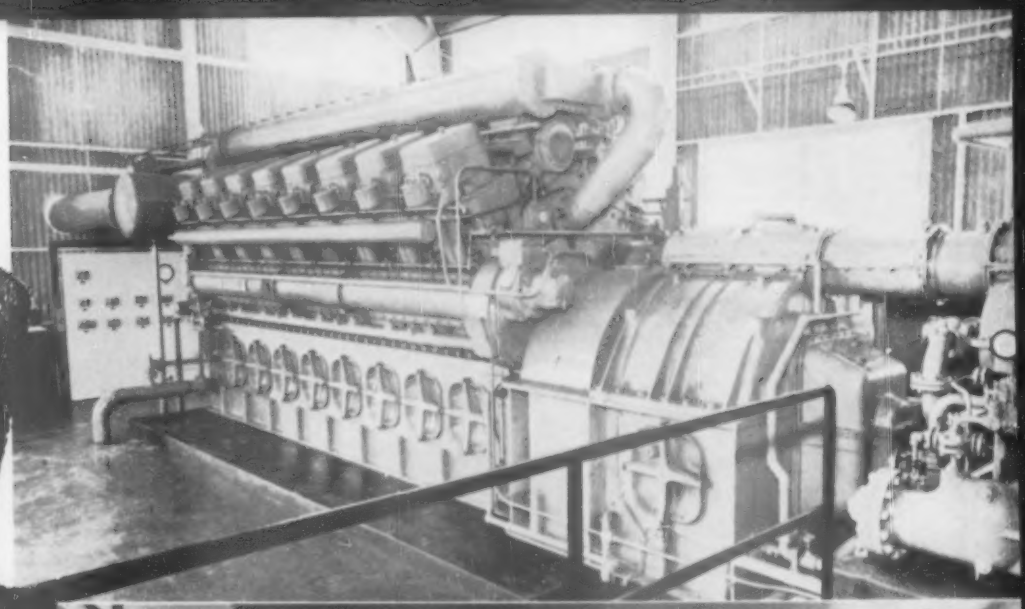

. . . on GAS PIPE LINES
This Nordberg Supairthermal Gas Engine—Gear Set drives a centrifugal compressor in Transcontinental Gas Pipe Line Corporation's Station No. 23.

. . . on CRUDE and PRODUCTS LINES
Twelve of these Nordberg Supairthermal engines provide over 22,000 hp for pumping stations on Lakehead Pipe Line.

NORDBERG SUPAIRTHERMAL® ENGINES

. . . your best investment in long term —low cost PIPE LINE POWER

• Nordberg has an enviable record of more than forty years of specialized experience in the field of heavy duty internal combustion engine design and manufacturing. This valuable experience has proved, through hundreds of pipe line installations, that Nordberg Engines have set, and are continuing to set, new standards of performance for efficient, low cost pipe line pumping operations . . . on crude, products and gas lines.

Backed by this broad experience and proved performance, today's modern line of Nordberg SUPAIRTHERMAL Engines are, by all standards, your best investment in modern prime movers for compact, economical, long term pipe line power. These engines are built in both in-line and V-types, in sizes from 500 up to 5,000 hp, for Diesel, Duafuel® or Spark-Ignition Gas operation.

We welcome your inquiry and the opportunity to assist you in your power study.

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG

DIESEL • DUAFUEL® AND SPARK-IGNITION GAS ENGINES

O456

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The Cleveland 240—a compact, powerful, perfectly balanced trencher—fits pipeline jobs of all types, large and small, digs down to 6' 3" deep and up to 3' wide. The 240 shown here is cutting trench for Oklahoma Pipe Line Constructors on Plantation Pipe Line Company's 327-mile 18" products line between Baton Rouge, Louisiana and Helena, Alabama.

Dig 'em and Fill 'em with CLEVELANDS

The Cleveland 190—a one-man operated, fast working, high capacity backfiller—has cut backfill and clean-up costs for pipeliners throughout the U. S. and Canada. It's doing a good, clean, fast job here in hilly terrain for Oklahoma Pipe Line Constructors on the TGT 26" line near Uhrichsville, Ohio.

Good Everywhere

THE CLEVELAND TRENCHER COMPANY

20100 St. Clair Avenue • Cleveland 17, Ohio

Pipeline Patrol

Project: 29 miles of 18-in. from Panoma Plant to Dumas Plant, Texas.
Status: Planned.
Project: 84 miles of 34-in. looping on San Juan main line and 21 miles of 30-in. looping on Permian-San Juan line.
Status: Planned.
Completion: June 30, 1957.
Project: 23 miles of 20-in. from South Andrews Station to Shell's TXL Plant, Texas.
Status: Planned.
Project: 9 miles of 16-in. from Shell's TXL Plant to Goldsmith Plant, Texas.
Status: Planned.
Project: 8 miles of 26-in. Southern System second loop west of Gila Station, Arizona.
Status: Planned.
Project: 28 miles of 10-in. in Nolan and Coke counties, Texas.
Status: Under way.
Contractor: **McVean & Barlow.**
Completion: January 1, 1957.

Fish-Service & Management Corp. (Agent for Cascade Gas Co.)
Project: City distribution system—205 miles of 1 to 8-in. in Washington and Oregon.
Status: Under way.
Contractor: **Ted Price Construction Co.,** Electric, Tex. Three spreads—M. E. Pulliam, spread superintendent, office at Walla Walla, Wash.; K. D. Garrett, spread superintendent, office at Pendleton, Ore.; E. E. Hanks, spread superintendent, office at Baker, Ore.
Completion: 1957.

Hope Natural Gas Co.
Project: 22 miles of 8-in. in Logan County, West Virginia, and 20 miles of 3 to 8-in. in various West Virginia counties.
Status: Under way.
Contractor: **R & M Pipelines, Inc.,** Charleston, W. Va.
Completion: Late 1956.

- **Houston Texas Gas & Oil Corp.**
Project: 960 miles of 26-in. between Baton Rouge, La., and Miami, Fla., plus 500 miles of sales laterals in Florida, with main line joining Coastal Transmission's proposed line from McAllen, Tex., to Baton Rouge.
Status: Pending FPC approval.

- **Iron Ranges Natural Gas Co.,** St. Paul.
Project: 68-mile transmission line and 47 miles of laterals to supply towns on the Mesabi Iron Range, Minn.
Status: Application pending with FPC.

- **Kansas-Nebraska Natural Gas Co., Inc.**
Project: 11 miles of 12-in. from Scott City to Oakley, Kans., to replace equal quantity of 8-in.
Status: Has FPC permit.
Completion: December 1956.

- **Lone Star Gas Co.**
Project: 230-mile line from Cotton County, Oklahoma, to Fritch, Tex., and a 205-mile line from Snyder, Tex., to hook up with the Cotton-Fritch line. Being contested by Natural Gas Pipeline Co. of America.
Status: Application pending with FPC.

Michigan Consolidated Gas Co.
Project: 67 miles of 10 and 12-in. between Sears and Travers City, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.;** Floyd Huduall, spread superintendent, office at Cadillac, Mich.
Project: 60 miles of 10 and 12-in. between Muskegon and Ludington, Mich.
Status: Under way.
Contractor: **Somerville Construction Co.,** jointly with **J. L. Gentry Construction;** Frank Morris, spread superintendent, office at Hart, Mich.

- **Michigan Wisconsin Pipe Line Co.**
Project: 142 miles of loops in Wisconsin and Illinois.
Status: Under way.
Contractors: **H. C. Price Co. and Houston Contracting Co.** Price will build 56 miles of 24-in., and Houston will build 42 miles of 20-in. and 51 miles of 16-in. (being handled by Latex Construction Co. of Georgia), spread office at Fond du Lac, Wis.
Project: 31 miles of 6, 4-in. new and loop lines in Michigan and Indiana, and 24 miles of 24-in. looping in Wisconsin.
Status: Has FPC permit.
Completion: 1957.

- **Midwestern Gas Transmission Co.**
Project: Will build main line from Portland, Tenn., to Canadian border near Emerson, Man.; 829 miles of 24-in., 109 miles of 16-in., 174 miles of 12-in., 648 miles of 3 to 18-in. extensions in Minnesota and Wisconsin.
Status: Application pending with FPC.

Montana-Dakota Utilities Co.
Project: 28 miles of 12-in. from Fallon County to Dawson County, Montana.
Status: Under way.
Contractor: **Ross Powers Construction Co.,** Billings, Mont.

- **Mountain Fuel Supply Co.,** Salt Lake City
Project: 38 miles of line to connect with Pacific Northwest Pipeline Corp.'s system in Sweetwater County, Wyoming.
Status: Has temporary FPC permit.

- **Natural Gas Pipeline Co. of America**
Project: 350 miles of 20 and 26-in. from Jack and Wise counties, Texas, to Fritch, Tex., which is being contested by Lone Star Gas Co.
Status: Has FPC approval.
Project: 389 miles of 36-in. loops along its line from Beatrice, Neb., to Chicago, to take gas from proposed line of Colorado Interstate Gas Co., and for 91 miles of 30-in. loops along parts of its main line.
Status: Application pending with FPC.

Niagara Mohawk Power Corp.
Project: 272 miles of 2 to 12-in. distribution mains for growth of service area in central, eastern, and northern New York.
Status: Fifty per cent completed.
Contractors: Various.
Completion: December 31, 1956.

- **North Carolina Natural Gas Corp.** (Subsidary of Colonial Natural Gas Corp.)
Project: 575 miles of 3 to 16-in. from Transcontinental Gas Pipe Line Corp.'s system near Mooresville, eastwardly across north Carolina.
Status: Has permit from North Carolina Utilities Commission.

- **Northern Natural Gas Co.**
Project: 11 miles of 16-in., 81 miles of

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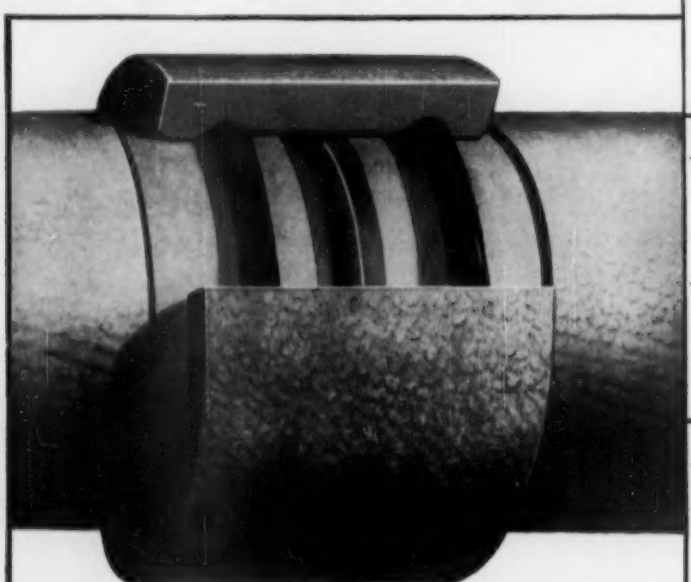

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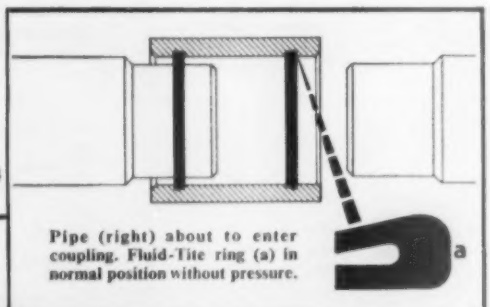
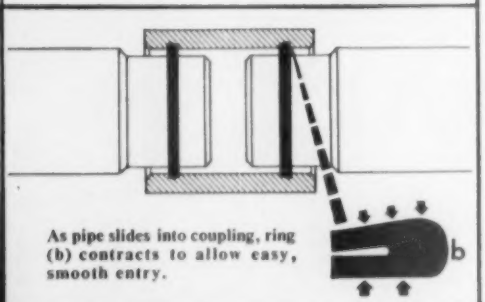
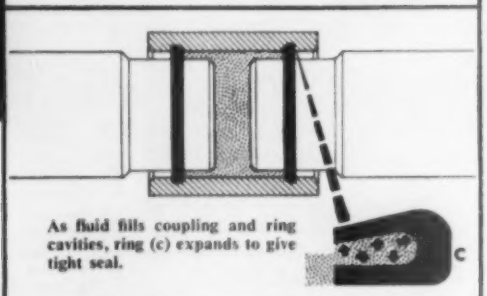


Pipe (right) about to enter coupling. Fluid-Tite ring (a) in normal position without pressure.



As pipe slides into coupling, ring (b) contracts to allow easy, smooth entry.



As fluid fills coupling and ring cavities, ring (c) expands to give tight seal.

Pipeline Patrol

12-in., 71 miles of 10-in. from Sioux Falls, S. D., to Aberdeen, S. D.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Completion: Late 1956.

Project: 160 miles of 2, 3, 6, 8-in. branch lines to serve 20 new communities on Aberdeen, S. D., line.

Status: Under way.

Contractor: **Troth Construction Co.**

Project: 15 miles of 24-in. looping north and south of Hooper, Neb.

Status: Under way.

Contractor: **R. H. Fulton & Co.**

Project: 8 miles of various size branch lines to serve 8 new communities in Iowa.

Status: Under way.

Contractor: **Underground Constructors, Inc.**

Project: 73 miles of 20-in. from Savana Creek to Pincher Creek fields in Alberta, Canada; 32 miles of 24-in. from Pincher Creek to Montana border; 1,100 miles of 26-in. from Montana into Minneapolis.

Status: Planned.

- **Offshore Gathering Corp.,** Houston.

Project: 364 miles in Gulf of Mexico off Louisiana.; 60 miles of 24-in., 70 miles of 26-in., 234 miles of 30-in.

Status: Application pending with FPC.

- **Ohio Fuel Gas Co.**

Project: 19 miles of 5, 12, 16-in. to replace or loop present facilities serving Dayton and Toledo areas, and extend service to McCutchenville.

Status: Pending FPC approval.

- **Pacific Gas & Electric Co.**

Project: 37 miles of 20-in., 37 miles of 18-in., 9 miles of 12-in. from Beehive Bend field near Willows, Calif., to near Davis, then to Sacramento.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**

Project: 135 miles of 34-in. looping of the Topock-Milpitas line.

Status: Under way.

Contractor: A joint-venture firm, **Midwestern-Johnson-Dixon,** has 85 miles to complete this year.

Completion: Major part to be laid in 1956; 62 miles in 1957.

Project: 200 miles of 12-in. from Sacramento Valley gas fields to Humboldt County, California.

Status: Has filed for approval of California's Public Utilities Commission. To start early 1957.

Completion: December 1, 1957.

- **Pacific Northwest Pipeline Corp.**

Project: 37 miles of 6-in. from Dove Creek to Nucla, Colo., and 13 miles of 4-in. from Nucla to Urvan, to serve Union Carbide Nuclear Co. and Vanadium Corp. of America.

Status: Has FPC permit.

- **Panhandle Eastern Pipe Line Co.**

Project: 82 miles of 4 to 12-in. gathering lines.

Status: Proposed. Bids have been requested.

Completion: December 31, 1956.

- **Peoples Natural Gas Co.**

Project: 4 miles of 12-in. from Evans City to Harmony, Pa.

Status: Planned. FPC permit not required.

Completion: January 1, 1957.

Permian Basin Pipeline Co.

Project: 19 miles of 16-in. in Andrews County, Texas.

Contractor: **R. H. Fulton & Co.**

- **Phillips Petroleum Co.**

Project: 54 miles of 2 to 10-in. in Hutchinson County, Texas.

Completion: January 1, 1957.

- **Piedmont Gas Co.,** Hickory, N. C. (Parent is Carolina Natural Gas Corp.)

Project: 78 miles of 2 to 8-in. extension off Trancontinental in North Carolina to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Application pending with FPC.

Southern California Gas Co. and Southern Gas Co. of California

Project: 241 miles of 30-in. from the outskirts of Los Angeles to Topock on the Arizona-California border.

Status: Right-of-way and ditch under way; pipe laying begins in January, 1957.

Contractor: **R. H. Fulton & Co.**

Completion: June 30, 1957.

Spokane Natural Gas Co.

Project: 400 miles of 1 through 24-in. distribution system at Spokane.

Status: Under way.

Contractor: **Hallmac Construction Co.;** V. L. Williams, spread superintendent, office at Spokane.

Completion: 1957.

- **Tennessee Gas Transmission Co.**

Project: 221 miles of 30-in., 101 miles of 26-in., and 10 miles of 24-in. looping from Portland, Tenn., to Greenup, Ky.; from Morehead, Ky., to Catlettsburg, Ky.; from Catlettsburg to Broad Run, W. Va.; from New Wilmington, Pa., to Mercer, Pa.; and from New Castle, Pa., to near Pittsburgh, Pa.

Status: Pending FPC approval.

Project: 51 miles of 26-in., 51 miles of 20-in., and 17 miles of 12-in. gathering lines from Kinder, La., to offshore fields in Gulf of Mexico.

Status: Pending FPC approval.

Project: 577 miles of 30-in. from Mississippi River delta area south of New Orleans to Portland, Tenn.

Status: Pending FPC approval.

- **Texas Eastern Transmission Co.**

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Pipeline Patrol

Project: 422 miles of 30-in. from near McAllen to Beaumont, Tex., to move imported Mexican gas; 45 miles of 24-in. laterals from McAllen to Provident City, Tex., 77 miles of 30-in. looping between Kosciusko, Miss., and Uniontown, Pa.; 147 miles of supply and sales laterals.

Status: Under way.

Contractor: **Houston Contracting Co.** has 121 miles of 30-in. between Angleton and Vidor, Tex., to start March 1, 1957. **H. C. Price Co.** has 70 miles of 30-in. **H. B. Zachry Co.** has 201 miles of 30-in. starting near McAllen and running northeast to near Angleton, Tex. **Grayco Constructors, Inc.** has 45 miles of 24-in. laterals from Blessing to Provident City. **Western Pipe Line, Inc.,** Austin, has 30-in. crossings at Nueces, Lavaca, and Carancahua bays. **Missouri Valley Dredging Co.,** Omaha, has crossings at Hinds and Guadalupe bays.

Completion: Fall 1957.

Texas Gas Transmission Corp.

Project: 120 miles of 20-in. and 11 miles of 16-in. from near Eunice, La., east to near Thibodaux, La.

Status: Work started late October.

Contractor: **Houston Contracting Co.** Spreads: 11 miles of 16-in. and 50 miles of 20-in. from near Eunice to near New Iberia, completed; 45 miles of 20-in. from near New Iberia to near Morgan City, M. L. Thompson, sperad superintendent, office at Franklin; 25 miles of 20-in from near Morgan City to near Thibodaux, W. H. Hayes, superintendent, office at Thibodaux.

Completion: December 15, 1956.

• **Trans Carolina Pipe Line Corp.,** Commercial Building, Raleigh, N. C.

Project: 300-mile system across North and South Carolina, plus 500 miles of laterals.

Status: FPC approval pending

• **Transcontinental Gas Pipe Line Corp.**

Project: 25 miles of 36-in. loops from Louisiana to South Carolina, 31 miles of 36-in. and 43 miles of 30-in. line.

Satus: Pending FPC approval.

Foreign Crude-Oil Pipelines

Arabian American Oil Co.

Project: 140 miles of 20-in. from Safaniya field to Ras Tanura, Saudi Arabia.

Status: Under way.

Bolivian Gulf Oil Corp.

Project: 160 miles of 10-in. and 43 miles of 8-in. from Sicascia to Arica on the Chilean coast.

Contractor: **Williams Brothers Co.**

Completion: December 1957.

• **B-A Alberta Pipe Line, Ltd.**

Project: 35 miles of 8-in. to connect Drumhell field, Alberta, with existing lines running to Edmonton.

Status: Pending approval.

• **Interprovincial Pipe Line Co.**

Project: 151 miles of 20-in. to extend present line from Sarnia to Port Credit, Ont.

Status: To start May 1957.

Completion: October 1957.

• **Iraq Petroleum Co.**

Project: About 600 miles of up to 40-in. from Kirkuk field through Iraq and Turkey to the Turkish port of Iskenderun on the Mediterranean sea.

Status: Proposed. Survey completed.

• **Mene Grande Oil Co.**

Project: 11 miles of 6-in. from Elias to Fria, and 10 miles of 10-in. from Limon to Leona-Dacion lateral, Venezuela.

Completion: First quarter 1957.

Project: 24 miles of 12, 14, 16-in. from Oficina Tank Farm to Oveja.

Completion: Late 1956.

• **North-West Oil Pipelines Co.** (newly formed by six West German refiners, headed by affiliates of Standard Oil Co. (N.J.), and British Petroleum Co., Ltd.)

Project: 210-mile line from the refining centers in the industrial Ruhr area of West Germany to Wilhelmshaven.

Status: Planned.

Completion: 1959.

Pembina Pipe Line, Ltd.

Project: 100 miles of 3 to 10-in. gathering system in Pembina field.

Contractor: **Sparling Davis Co., Ltd.**

Project: 200 miles of 3 to 12-in. gathering line in Pembina oil field.

Contractor: **Mannix, Ltd.;** F. Whitlow, spread superintendent, office at Pembina oil field.

• **Royal Dutch-Shell**

Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through Eastern France, Luxembourg, West Germany, and Netherlands, and Belgium. Main trunk to be 30-in.

Status: Company is considering project together with several other companies.

• **Sinclair Oil Corp. and Socony Mobil Oil Co.**

Project: 211 miles of 20-in. from the Silvestre field in Barinas, Venezuela, to Puerto Cabello on Caribbean Sea.

Status: Under way.

Contractor: **Williams Brothers Sudamericano, Ltd.**

Union of Soviet Socialist Republic

Project: 2,300-mile Trans-Siberian crude and products line from Ufa and the Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

Status: Under way.

• **Westspur Pipe Line Co.**

Project: 20 miles of 12-in. from Alida in southeastern Saskatchewan, to the Carnduff-Glen Ewen area to tap Cantal, Hastings, Florence, Carnduff, and Glen-Ewen fields; 34 miles of 4, 6, 8-in. gathering lines.

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Status: Planned. Has requested permit from Board of Transport Commissioners.

Yacimientos Petroliferos Fiscales (Argentina)
Project: 700 miles of 12-in. from Campo Duran to San Lorenzo.
Status: Under way.
Contractor: **TECHINT** (Compania Tecnica Internacional), Buenos Aires, has 90 miles.

Foreign Products Pipelines

Hydrocarbons Pipeline Co. (Subsidiary of Canadian Hydrocarbons)
Project: 800 miles of 6 and 8-in. L.P.G. line from near Edmonton, Alta., to Fort William, Ont.
Status: Has permit from Parliament of Canada. If approved by Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board, work will start early 1957.
Construction consultants: **Dutton-Williams Brothers, Ltd.**, Calgary, and **A. D. Little & Co.**, Boston.

• **Iraq Petroleum Co., Ltd.**
Project: 75 miles of 24-in. from Homs, Syria, to Tripoli, Lebanon.

Israeli Government
Project: A 6-in. line from the Haifa refinery to Tel Aviv.
Completion: Late 1957.

National Iranian Oil Co.
Project: 573 miles of 10-in. from Ahwaz to Teheran, Iran.
Contractor: **Enterpose of Paris,** has northern 236 miles. Southern section completed.

• **North Atlantic Treaty Organization (NATO)**
Project: 2,000 miles of lines to airfields in parts of Europe.
Status: Under way.
Contractors: **Associated Pipeline Contractors, Inc.,** has 450 miles from Iskenderun, Turkey, to Batman. **TECHINT** (Compagnia Tecnica Internazionale), Milano, Italy, has 205 miles of 4-in. from Bandirma to Eskisehir, Turkey, and 250 miles of 8-in. from Antalya to Eskisehir. Bids were taken in January 1956 on 300 miles of 12-in. between Marseille and Langres, France. Taking bids on 275 miles in northwestern France: 54 miles of 2-in. from Langres to Mirecourt, 63 miles of 2-in. from Mirecourt to Phalsbourg, 47 miles of 8-in. from Mirecourt to Metz, 30 miles of 8-in. from Phalsbourg to Deux Ponts, 35 miles of 8-in. from Phalsbourg to Strasbourg.

Petroleos Mexicanos
Project: 495 Km. of 12-in. from Tampico to Monterrey, Mexico.
Status: Under way.
Contractors: **Constructora El Aguila, S.A.,** and **Carreteras de Urbanizacion, S.A.**
Completion: Late December 1956.

United States Defense Department
Project: Sponsoring 485 miles of 8, 10, 12-in. from Cadiz to Zaragoza, Spain.
Contractors: Prime contractor — **Brown-Raymond-Walsh; Merritt Chapman & Scott, Benson & Montin** of Oklahoma City, **Agroman Construcion Co.** of Spain.

Yacimientos Petroliferos Fiscales Bolivianos (Y.P.F.B.)
Project: 190 miles of 4-in. from Camiri to Santa Cruz.
Status: Under way.
Contractor: Being built by Government.
Completion: December 1956.

Foreign Natural-Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**
Project: 637 miles of 34 to 16-in. gathering lines in Alberta.

Pipeline Patrol

Contractor: **Dutton-Williams Brothers, Ltd.,** has preliminary studies, design and management-engineering. **Mannix, Ltd.,** has crossing of Red Deer River near Cavendish, Alta.

Status: To start in 1957.

Andes Pipeline Corp. (Subsidiary of Glenn McCarthy, Inc.)

Project: 500 miles of 12-in. from McCarthy's Bolivian concession to the Chile copper-mining area.

Contractor: Will do own work.

• **Attock Oil Co.**

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.

Status: Planned.

Cia. Shell de Venezuela.

Project: 177 miles of 20-in. from La Paz field in the Maracaibo district, to the Cardon refinery on Paraguana Peninsula, to fuel refinery furnaces.

Status: Under way.

Completion: 1957.

• **Empresa Nacional Del Petroleo.**

Project: 80 miles of 10-in. from Concon to Santiago, Chile.

Status: Planned.

Imperial Oil, Ltd.

Project: 37 miles of 12-in. from Waterdown to North Toronto, Ont.

Status: Under way.

Contractor: **Majestic Contractors, Ltd.,** Odis Hare, spread superintendent, office at Cooksville, Ont.

Inland Natural Gas Co., Ltd.

Project: 350 miles of 12 to 4-in. system in British Columbia, and 400 miles of distribution piping in 31 towns.

Status: Clearing and grading under way.

Contractor: **Dutton-Williams Brothers, Ltd.;** Pat Campbell, project manager, office at Penticton.

Completion: September 1957.

Mid-Western Industrial Gas, Ltd.

Petroleos Mexicanos

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey in northern Mexico.

Status: Planned.

Project: 18 miles of 6-in. from the new gas plant at Redwater, Alta., to the nickel plant at Fort Saskatchewan, including a crossing of the North Saskatchewan River.

Status: Under way.

Contractor: **Fulton Banister, Ltd.**

Completion: Fall 1956.

South Alberta Pipe Line, Ltd.

Project: 150 miles of 8-in. from Etzikom field to serve a nitrochemical plant to be built near Medicine Hat, Alta.

Status: Filed for permit.

Sui Gas Transmission Co.

Project: 188 miles of 16-in. from Sui gas field to Moultan, Pakistan.

Status: Under way; to be extended later to Lahore with branches at Kot Addu, Jhang, Magiana, and Montgomery.

Contractors: **Pakistan Constructors,** a joint company of **Morrison-Knudsen** of Boise, Idaho, and **William Press, Ltd.,** of London.

• **Technical Office of Hydrocarbon. Ministry of Mines and Petroleum, Government of Venezuela.**

Project: 321-km., 26-in. line from Anaco to La Mariposa near Caracas.

Status: Proposed.

• **Trans-Canada Pipe Lines, Ltd.**

Project: 574 miles of 34-in. from the Alberta-Saskatchewan border to Winnipeg. (First part of 2,250-mile line from Alberta to Toronto and Montreal.)

Status: Under way.

Contractors: **Majestic Contractors, Ltd.** (104 miles from Burstall to Stewart Valley, Sask., R. L. Leaonard, spread supt., office at Cabri.; **Canadian Bechtel, Ltd.** (110 miles from Swift Current to Moose Jaw, Sask., J. L. Work, general supt., office at Moose Jaw, and 54 miles from Partoze La Prairie to Winnipeg); **Mannix, Ltd.** (90 miles from Moose Jaw to Welseley, spread superintendent, T. Anderson, office at Montmartre, Saskatchewan); **Dutton-Williams Brothers, Ltd.** (87 miles from Deveren to Moosomin, to start in 1957). **Price-Poole of Canada, Ltd.** has 100 miles from Miniota to near McGregor to start in 1957.

Union of Soviet Socialist Republic.

Project: 900 miles of 26-in. from Stavropol in the Northern Caucasus to Moscow. The line, larger than Russia's other two major gas lines which are only 16 and 18-in., will serve Voroshilovgrad, Voronezh, Tula, Yelets, and Serpukhov.

Status: Under way; approximately 50 per cent completed.

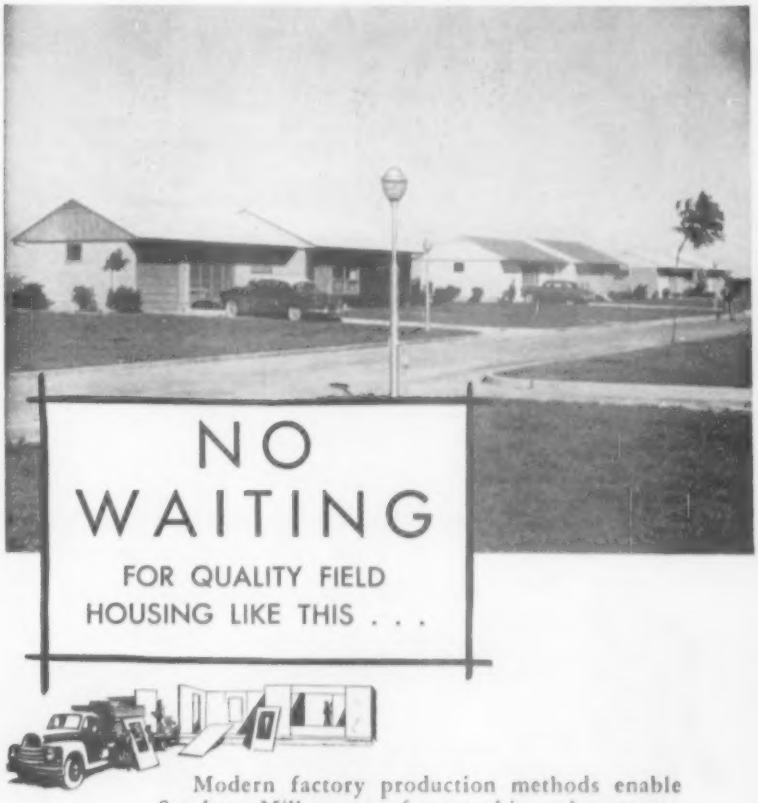
Westcoast Transmission Co., Ltd.

Project: 650 miles of 30-in. from Peace River area, Canada, to Sumas, Wash.

Status: Under way. About two-thirds completed.

Contractors: **Dutton-Williams Brothers, Ltd.,** has 120 miles from Taylor, B. C., to Azouzetta Lake, T. E. Davis, spread supt., office at Dawson Creek, B. C.; **Mannix, Ltd.,** has 110 miles between Huntingdon and Merritt, Fred Byers, spread superintendent, office at Chilliwack; **Canadian Bechtel, Ltd.,** has 210 miles from Alexandria to Pine Pass, B. C., H. F. (Hank) Mogg, spread man, office at Quesnel, B. C.; **R. A. Conyes Construction Co.,** has 210 miles.

Completion: Dutton-Williams section to be completed November 1957. R. A. Conyes section and Canadian Bechtel section to be completed September 1957.



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Among the Drilling Contractors

Committees Named for Contractors' Association

Appointments to standing committees of the American Association of Oil-well Drilling Contractors for the 1956-57 term have been completed. As announced by Jack H. Abernathy, president of the association, members of 5 of the 12 committees are:

Cable Tool: Chairman, Arthur Stout, McQueen and Stout, Midland, Tex.; vice chairmen, Ferd J. Spang, Spang & Company, Butler, Pa.; and Ray Wiley, Ray Wiley Drilling Co., Carmi, Ill.

Education and Training: Chairman, H. W. Davidson, Davidson Drilling Co., Midland; vice chairmen, W. K. Powell, Beard Drilling Co., Duncan, Okla.; and J. K. Kellogg, K. L. Kellogg & Sons, Compton, Calif.

Insurance: Chairman, J. L. Stauss, Falcon Seaboard Drilling Co., Tulsa; vice chairmen, Hunter Eakle, Eakle & Holder Drilling Co., Evansville, Ind.; and David A. Kimbell, Alan Drilling Co., Wichita Falls, Tex.

Rotary Drilling: Chairman, William P. Clements, Jr., Southeastern Drilling Corp., Dallas; vice chairmen, B. E. Groenewold, Exploration Drilling Co., Tulsa; and Earle C. Hellums, Gracey-Hellums Corp., Houston.

Safety: Chairman, Donald J. Gillespie, Glenn Gillespie & Sons, Cushing, Okla.; vice chairmen, W. S. Fitzpatrick, Fitzpatrick Drilling Co., Corpus Christi; and Robert W. Bass, Robert M. Bass, Kilgore, Tex.

Loffland Brothers Co., Tulsa, will drill Pure Oil Co.'s projected deep wildcat test in Block 126, West Cameron area, in the Gulf of Mexico, off Cameron Parish, Louisiana. Location is 20 miles from nearest land, and 15 miles from nearest field. Plans call for a 15,000-ft. test.

Warren-Burdette Drilling Co., Houston, has contracted for an 8,500-ft. test to be drilled for Anthony J. Tamborello, of Houston, at a wildcat location 3½ miles southeast of East Perkins field, in northern Calcasieu Parish, southwestern Louisiana. Location, at 1 Edgewood, in 5-8s-9w, is 10 miles northwest of Lake Charles.

Austin-Price Drilling Co. is contractor for Arthur Finston and Apache Oil Co. on a 4,800-ft. Arbuckle test northwest of Frederick, in Tillman County, southwestern Oklahoma. Location is on the operators' Eberle lease, in 20-1s-18w.

J. B. Fletcher Drilling Co. has a new wildcat location in Cherokee County, East Texas. It is a contract job for Marshall Steffenson (trustee) at 1 Holliday, in the George Rudell Survey, 6½ miles west of Alto. Contract is for 5,500 ft.

R. L. Gibson Drilling Co., Kilgore, Tex., has a rig working for Woolf & Magee, of Tyler, on a wildcat test, 1 Arnold, in the M. Henritquez, south

ON DECK of Delta Marine Drilling Co.'s new offshore drilling tender, the Joseph Zeppa. Shown, left to right, are: Billy Morrow, construction superintendent; George Stetson, chief engineer; I. J. Flowers, drilling superintendent; and Bill Green, tool pusher, all of the contracting company. Delta Marine is another Zeppa enterprise, recently organized, and affiliated with Delta Drilling Co. and Delta Gulf Drilling Co., of Tyler, Tex. The tender, going into contract operation off the Louisiana Coast, has the distinction of carrying the first self-sustaining alternating-current electric rig.

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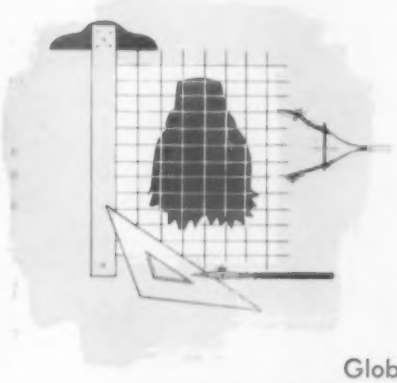

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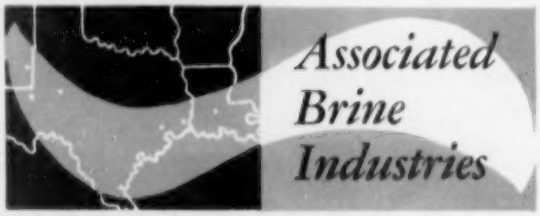

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Brine Service Co.	*Houston, Corpus Christi*
Toland Brine Service, Inc.	*Kermit, Tex.*
The Brine Co.	*Midland, Tex.; Hobbs, N. M.*

of Arp, in Smith County, East Texas. It is a 4,500-ft. job.

A. W. Williams Drilling Co., Mobile, Ala., is drilling on a new contract job in Clarke County, eastern Mississippi. It is a wildcat test for Love Petroleum Co. and Harold R. White at 1 Bartee, in 9-1n-14e, about 2 miles south of Nancy. Nearest field is Heidelberg, 7½ miles southwest, in Jasper County. Contract is for 5,300 ft.

Milton Crow, Inc., Shreveport, is drilling a 9,000-ft. Cotton Valley-Bodcaw test for States Oil Co. at a wildcat location a mile north of Blackburn field, in Claiborne Parish, North Louisiana, where the same operator completed a Bodcaw gas-condensate discovery-well last April. Lately, the operator has completed its second well about a mile west of the discovery. The present test is its 1 Baskin, in 18-22n-8w.

Jack Haley is contractor on another cable-tool wildcat test Hill & Meeker, of Midland, Tex., is starting in southwestern Loving County, in far-western Texas. Location, 1 Johnson "12-A", is 9 miles north of Mentone, and about 2½ miles southeast of the same operator's recently completed Delaware-sand oil discovery well with pay at 4,500 ft. The new operation also is projected to the Delaware sand with contract depth of 4,700 ft.

Atlas Drilling Co., Opelousas, La., has taken on a contract for a 12,500-ft. test to be drilled for North Central Oil Corp. on the North Jennings prospect in western Acadia Parish, Coastal Louisiana. Location, at 1 Clement, in 51-9s-2w, is about 2 miles north of production on the old Jennings dome.

Coastal Drilling Co., Los Angeles, has a projected 13,000-ft. exploratory test under way for Honolulu Oil Co. in the Coalinga Nose area, southwestern Fresno County, Central California. The operation is carried as Honolulu's 48 SPL, in 25-19-16. Coastal's rig on the job is one used on The Texas Co.'s recently completed deep test in Tejon field.

J&B Drilling Co., DeQuincy, La., is contractor on a new deep wildcat test Texas Eastern Transmission Co. is undertaking in southwestern Evangeline Parish, southern Louisiana. Location at 1 Heinen, in 38-6s-1w, is 2 miles northeast of Basile field, across the line in northwestern Acadia Parish. Production at Basile, discovered in 1951, is gas and condensate from two wells completed in an 8,400-ft. sand.

Rugged Chicago Pneumatic Three Cone Rock Bits are designed to afford deep penetrating action with every turn of the drill stem. Their fast cutting speed enables you to drill more feet a day. They're available in seven different types from soft to exceedingly hard and abrasive formations. *Oil Tool Division, Chicago Pneumatic Tool Company, 5000 U. S. Highway 81 South, Fort Worth, Texas.*

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the OIL AND GAS JOURNAL

Showcase

OF NEW EQUIPMENT AND LITERATURE

by Dan B. Miller

Business Planes Offer Easier Flying

Two new four-place airplanes offer simple, comfortable flying to the business-man pilot. Model 182 features a lowered Land-O-Matic gear which gives the pilot good control during takeoffs, landings, taxiing, and parking. Model 180 is equipped with a spring-steel landing gear and castering wheels have been added as standard equipment.

Both models have engines that develop 230 hp. at 2,600 r.p.m. Both have approximately the same speed, 165 m.p.h. at sea level; and range, 655 miles or 4.2 hours. The baggage compartment will hold up to 120 lb. Standard equipment includes adjustable front and rear seats, cabin heater, cigarette lighter, foam-rubber seat cushions, starter, windshield defroster, and key-operated baggage-door lock.

The flight instruments have been regrouped for easier reading. A fuel-strainer drain valve can be operated from the cabin and a new carburetor improves fuel consumption. **Write or call: Cessna Aircraft Co., R.F.D. No. 5, Wichita, Kans., for more information on airplane Models 180 and 182.**

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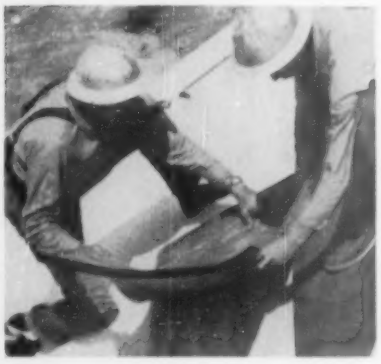

Foamed-Plastic Insulation Fits Irregular Surfaces

This new, flexible foamed-plastic sheet insulation adapts itself to curved or irregular surfaces with little fitting or cutting.

The flexibility of Armaflex sheet insulation adapts it to insulating large tanks, irregularly shaped vessels, oversize pipes, and refrigeration and air-conditioning equipment.

The material will withstand temperatures as high as 160° F., with no limitation at the low end of the temperature scale, since thickness can be built up by applying successive layers.

Armaflex sheets have a k factor of 0.28 at 75° F. mean temperature and a water-vapor permeability of 0.1. They are available in thicknesses of ⅛, ¼, ½, and ¾ in. in sheets 30 by 36 in.

The foamed-plastic sheets stick to almost any clean, dry surface with an adhesive. They do not require any mechanical supports. No vapor barrier is necessary, but it is recommended

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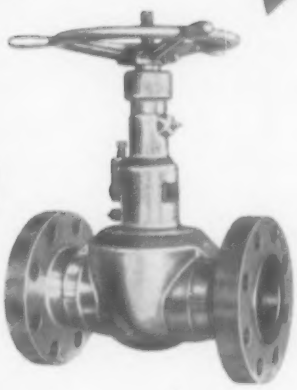

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that outside installations be protected by an application of aluminum or asphalt paint, or Armstrong Insulcolor. **For more information write or call: Armstrong Cork Co., Lancaster, Pa.**

●

Polyethylene Floats Reduce Evaporation From Tanks

An evaporation barrier cuts down tank evaporation by as much as 75 per cent. Known as Mini-Vaps, the barriers are expanded-polyethylene miniature floats containing tiny air cells for buoyancy and light weight. They exhibit the chemical and solvent resistance of polyethylene and withstand rough usage.

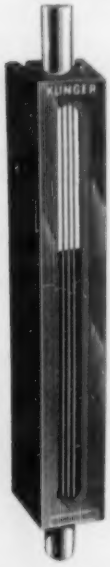
The surface contours of Mini-Vaps provide for extensive interlocking and clustering at the surface of volatile solutions. Suggested applications for the product include plating tanks, fermentation tanks, and oil storage. **Write or call: American Agile Corp., P. O. Box 168, Bedford, Ohio, for more information on Mini-Vaps.**

●

Lubricated Packing Made for Polished Rods

Circle-Em packing has been developed for use on oil-well polished rods. It is made of soft, plaited asbestos and has lead center rings, and low-friction end rings. The end rings in each set are designed to resist the abrasive action of sand and grit, while excluding such solids from the center of the stuffing box. In addition, the end rings have a low friction coefficient insuring smooth performance, and also are treated with special oil-resistant compound.

The center rings, composed of plaited asbestos and lead, are the sealing rings. These rings are compressible. They seal against leakage and will follow the eccentric motion of the rod to insure satisfactory service. The rings are lubricated with the same high-quality oils and flake graphite that is used in packings for high-speed centrifugal-pump service. This helps to avoid burning of the packing when wells pump dry. The packing requires no special tools for installation. **Write or call: Monarch Engineering Corp., 15805 South Main**



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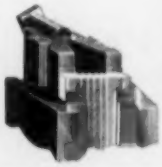
The "K" Type Reflex Level Gage has the following outstanding advantages:—

Single row of tightening bolts
Body free from distortion
Glass easily removed
Gage body turnable, free to expand, and easily removed.

The "K" Type Gage is made in a wide variety of sizes and any number of bodies can be combined to provide level indicators of any length.



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Street, Gardena, Calif., for more information on Circle-Em polished-rod packing.

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New Vinyl Coating Has Mild Odor, Is Easy to Apply

A new vinyl maintenance coating, Ucilon 1400, provides corrosion resistance of previous vinyl-based coatings but eliminates strong odors and the need for careful surface preparation. Ucilon 1400 resists acids, alkalies, water, and other causes of early paint failure. It can be used for walls, floors, ceilings and the exteriors of equipment to resist corrosive fumes in petrochemical plants and refineries.

The new coating is self-priming and brushes out like oil paint with no sagging or dripping. It can be applied over bare metal, wood, masonry, and most previously painted surfaces without special surface preparation. Its mild odor and high flash point (105° F.) permit application without interference with plant routines. Users may choose from six colors to combine good appearance with a durable protective coating. **Write or call: Metal & Thermit Corp., Rahway, N. J., for more information on Ucilon Coating 1400.**

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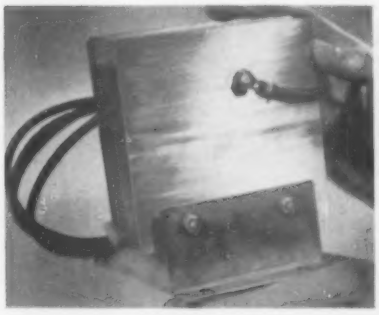
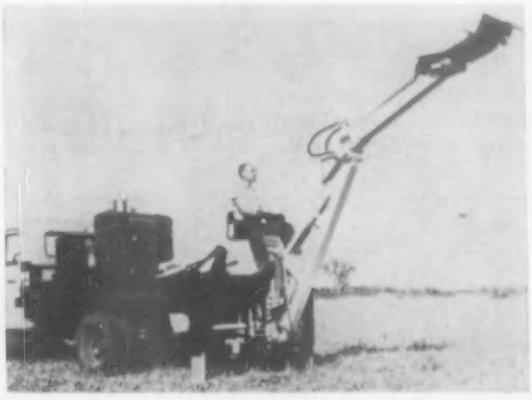


Silicon Diodes and Stacks Gives Rectifier Long Life

A new rectifier for cathodic protection against corrosion employs silicon diodes and stacks instead of the conventional selenium. The new units will last longer and maintain a high efficiency in operation throughout their life. Higher operating temperature characteristics minimize deterioration in hot climates.

The new rectifiers are also smaller, as they have the same capacity as selenium rectifiers up to 18 times their physical size. **Write or call: The Holcombe Co., Inc., First National Bank Building, Shreveport, La., for more information on silicon diode rectifier.**

OIL AND GAS JOURNAL Showcase
.....OF NEW EQUIPMENT



Back-hoe Unloads in 5 Minutes

A truck-mounted back-hoe folds and retracts on the truck bed for compact transporting. It will fit most one-ton or larger flat-bed trucks with no modification of the truck bed. The basic back-hoe frame fits onto a truck-attaching kit that has retractable runners actuated by a hydraulic ram so that the unit can be loaded or unloaded from the truck with a hydraulic valve. It can be removed from the truck in less than 5 minutes, leaving the truck bed completely free of any equipment.

A set of legs folds down to form a stand with the back-hoe stabilizer feet. The back-hoe moves from the transport position to the digging position in 1 minute. In operation the back-hoe stabilizer feet absorb the wear and tear with the truck serving as a counterweight.

A new type of rotary-hydraulic cylinder permits a 200° continuous operating arc without changing a pin and without the use of cables. The 210 model also has interchangeable mount-

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ing locations at each end of the frame to permit digging flush alongside a wall, fence, house, or building. **Write or call: Mid-Western Industries, Inc., 1009 South West Street, Wichita, Kans., for more information on Davis backhoe.**

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Corrosion Inhibitor Needs Low Dosage of 10-20 P.p.m.

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Protection is afforded because corrosive elements in the fuel are prevented from contacting metal surfaces by the 160-T protective film. After it is added, the chemical and product need not be agitated. The film stays on the metal until the product is taken out of storage. **Write or call: National Aluminate Corp., 6216 West Sixty-sixth Place, Chicago 38, Ill., for more information on 160-T corrosion inhibitor.**

●

SAVE VALUABLE FIELD TIME WITH ENARDO CLOCKS

Save time and trips by installing an Enardo Clock Shut-Off Valve.

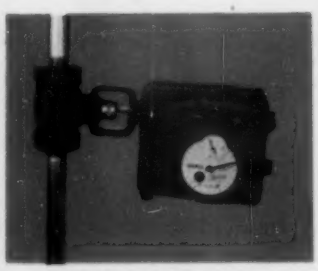
You can soon pay the initial cost of installing the Enardo Clock by saving the return trips necessary to check installations.

The Model "W" Clock is designed to control the flow of low pressure gas or liquid and to shut off the supply at a predetermined time, with a positive bottle tight seal. Valve will function at operating pressures up to 100 p.s.i.

The Enardo "MB" and "A" time cycle switches are designed to control electrical circuits on pumping engines and other equipment. They will shut-down the engine at any number of hours, up to 22 hrs. on the 24 hr. model; and 11 hrs. on the 12 hr. model. All clocks are manually wound and set.

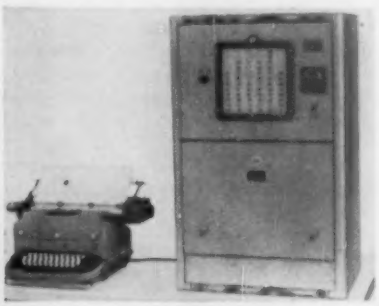
Always look to Enardo for the finest in oil field equipment.

"A" & MB Type Time Cycle Switch



"W" Clock Shut-Off Valve

ENARDO manufacturing co.
BOX 1647 • TULSA, OKLAHOMA

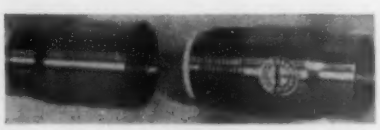


Liquid-Level Controls Now Record Data With Typewriter

A new function of a line of liquid-level telemetering and supervisory controls is to handle data recording at predetermined intervals. This is desirable where close control of the flow of petroleum products is needed

This additional function supplements a pulse-code receiver with converter equipment which operates a solenoid-actuated typewriter unit. Data is logged to permit accurate inventory control and the printed report can be used by the accounting department. **Write or call: Vapor Recovery Systems Co., 2820 North Alameda Street, Compton, Calif., for more information on the pulse-code receiver.**

●



Teflon Seals Leakproof Old and New Tubing Joints

This slim tubing-joint seal for integral joints and the GT-API coupling seal for tubing both employ Teflon. The Teflon seals will withstand modern drilling pressures and assure leakproof joints for new strings of tubing and

pipe and also can be used to make old tubing and pipe hold pressure. Such sealed couplings find use in all types of pipe connections such as gas and water lines. The seals have been tested to 12,000 psi. **Write or call: Hardy - Griffin Engineering Corp., 14522 South Main Street, Houston, Tex., for more information on tubing-joint seal and the GT-API coupling seal.**

●

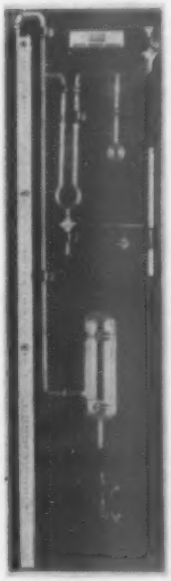
Venturi Tube Comes In 6 to 96-In. Diameters

A new venturi tube, called Type PVF, is used for the measurement of fluids, both liquid and gas. Advantages include lightweight and the ability to maintain close manufacturing tolerances. The tube is adaptable for a variety of end fittings and may be equipped with welded or slip-on flanges. It also may be furnished with welding or bell and spigot ends, or may be used with mechanical couplings.

The new tubes conform to conventional venturi dimensions and are offered in sizes ranging from 6 to 96 in. in diameter. The entire inner section is constructed of stainless steel. **Write or call: Burgess-Manning Co., Penn Instruments Division, 4110 Haverford Avenue, Philadelphia 4, Pa., for more information on PVF venturi tube.**

●

Vapor-Pressure Instrument Analyzes Petroleum Gases



A new petroleum instrument increases the accuracy of low-temperature fractional analyses by eliminating holdup error and uncertainties in determining cutpoints. A vapor-pressure apparatus is used to analyze the binary mixture collected between plateaus of any two fractions and provides information regarding the composition of the original mixture.

Analysis is made of binary mixtures ranging from methane to isopentane, nitrogen content of natural gases, and cutpoint between isobutane and normal butane. The vapor-pressure apparatus may also be used in analyzing samples of natural gas for nitrogen, methane, and ethane without previous fractionation.

The instrument operates by taking the transition fraction obtained from low-temperatures distillation of the sample and analyzing it further by the vapor-pressure method. The transition fraction is transferred to an evacuated bulb in the vapor apparatus at liquid-nitrogen temperature. Measurements of vapor pressure are then made under standardized conditions and at fixed temperatures controlled by suitable refrigerant. **Write or call: Central Scientific Co., 1700 Irving Park Road, Chicago, Ill., for more information on vapor-pressure apparatus.**

The McNamar portable gasoline plant is designed for flexible application and automatic operation.

The simplicity in design, the ease of moving from one location to another and the dependable operation are factors that greatly reduce operating and maintenance costs.

McNamar portable gasoline plants can be used to control the hydrocarbon content of the sales gas, to economically recover gasoline and LPG, and to process the expanding gas production in an undeveloped field.

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OIL AND GAS JOURNAL Showcase

- BULLETINS
- CATALOGS
- BROCHURES

The Kaye Turbistat is illustrated and discussed in a new data sheet. It gives specifications and applications of this instrument which provides continuous monitoring of turbidity in fluids. The data sheet, hole-punched for reference catalogs, explains that the operating principle of the Turbistat is based on a dual-beam system whereby light scattered by suspended particles is compared with light transmitted by the fluid. **Write or call: Baird Associates-Atomic Instrument Co., 33 University Road, Cambridge 38, Mass., for Kaye Turbistat Data Sheet.**

●

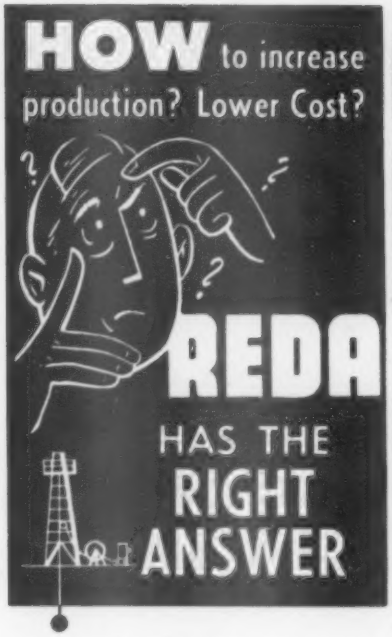
Eight New Products of Dowell Research to Assist in Faster Payout Through Increased Oil and Gas Production. This four-page, two-color folder describes products, services, and methods. These include Sandlock, for stopping the flow of loose sands; Riverfrac, Dexet cement; Cealment, a latex-cement slurry; stabilized acid; fluid-loss additive; and remote-controlled Allison-powered pump trucks. Other services and products are explained. **Write or call: Dowell Incorporated, P. O. Box 536, Tulsa 1, Okla., for more information on oil-well service and products folder.**

●

Model 40 Stationary Diesel Engines are described in Bulletin 108. These diesels are four-cycle, six and eight cylinders, naturally aspirated or supercharged, and are rated at 215 to 1,025 hp. continuous. The bulletin includes dimensions, specifications, and engine designations. **Write or call: White Diesel Engine Division, Springfield, Ohio, for more information on Model 40 diesels.**

●

Homestead Lubricated-Plug Valves. This new 28-page catalog illustrates and describes 100 per cent pipe area, venturi, round-port, and diamond-port lubricated-plug valves in a variety of metals for 150-psi. steam w.p., 200-psi. oil-water-gas, and A.S.A. 150 and 300-psi. classes. Complete with engineering dimensions, this catalog also presents different types of power opera-



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tors for valves, in addition to complete lines of lever-operated, and worm and gear-operated valves. **Write or call: Homestead Valve Manufacturing Co., Coraopolis, Pa., for Reference Book 39—Section 5.**

●

Omega Feeders for Continuous Industrial Processes. The accurate feeding of two or more liquids and/or solids into continuous processes by gravimetric or volumetric means can be accomplished by the proportioning equipment described in a four-page Bulletin 10-N1. This bulletin illustrates and gives capacities, accuracies, and ranges of and types of materials handled by feeders, lime shakers, and proportioning pumps. **Write or call: Omega Machine Co., 345 Harris Avenue, Providence, R. I., for more information on Bulletin 10-N1.**

●

Gas Lift Technical Manual covers gas-lift theory and practice, detailed installation procedures, formulas, charts, tables, and appropriate illustrations. Written from a technical standpoint, this manual was prepared as a general reference book to aid in the designing of gas-lift installations. Included are valve-spacing charts, for continuous-flow installations, covering four ranges of flowing gradients. It contains 36 pages. **Write or call: The Guiberson Corp., Dallas, Tex., for the gas-lift technical manual.**

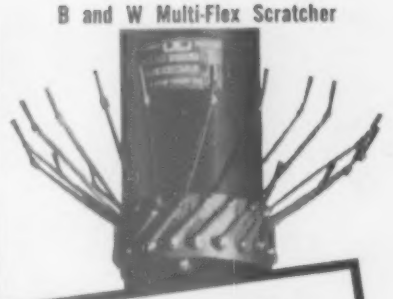
●

Fibercast Line Pipe and Well Tubing is made from thermosetting reinforced epoxy resins. Described in a three-color, four-page folder, this nonmetallic pipe offers these advantages: corrosion-resistance, high-temperature usage, and high strength. This pipe will withstand salt water with little deterioration. The folder includes tables giving pipe sizes, wall thicknesses, and operating pressures for both line pipe and well tubing. **Write or call: The Fibercast Corp., P. O. Box 727, Sand Springs, Okla., for Fibercast Line Pipe and Well Tubing folder.**

●

Water Analysis is a revised, enlarged edition of the technical and engineering-service Bulletin 11. This 100-page bulletin contains separate sections on the analysis of various types of waters including polluted and stationary-boiler water. Also included in the bulletin are tables of analytic data, conversion factors, and turbidimetric and color standards, and a special section on the preparation of reagents, indicators and standard solutions used in analyses. **Write or call: Solvay Process Division,**

B and W Multi-Flex Scratcher



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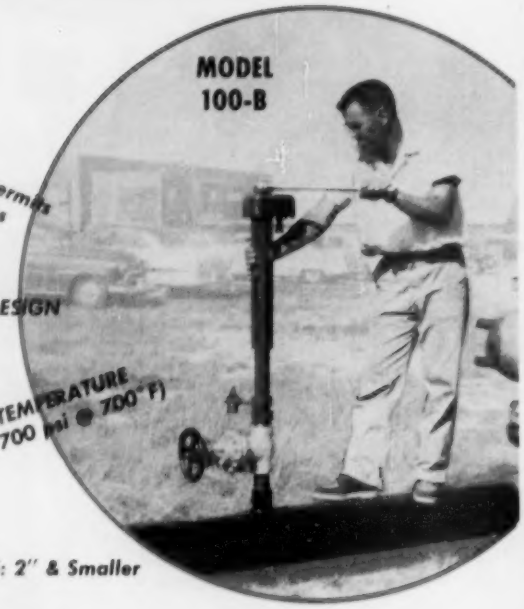

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Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y., for water analysis Bulletin 11.

●

Bendix Computer Application Report No. 2. A four-page illustrated report describes how a complex construction problem on a natural-gas pipeline was solved with a computer in less than 12 minutes at 900 per cent cost saving. The problem of determining source and destination pressures over a 300-mile pipeline, the equations used, and the methods of computation are explained with the aid of diagrams. **Write or call: Bendix Computer, Division of Bendix Aviation Corp., 5630 Arbor Vitae Street, Los Angeles 45, Calif., for Bendix computer application report No. 2.**

●

Now You Can Pump Pressures Up to 1,000 Psi. in Portable Aluminum Pipelines. This two-color folder shows hook-up photographs, cutaway views, and on-the-job pictures of a new fast-move coupler. It is available in 2, 3, and 4-in. I.P.S. or o.d. sizes. Pipelines furnished with these couplers can be used to supply water to drilling rigs, as temporary gathering lines, or to transport corrosive or abrasive materials. **Write or call: John Bean Division, Food Machinery & Chemical Corp., P.O. Box 145, San Jose 3, Calif., for more information on the fast-move coupler for portable aluminum pipelines.**

●

Wirth Rotation Drilling Machines are presented in five sizes ranging from road-drilling machines to those capable of oil-well drilling to 3,900 ft. They can be used for shot-hole drilling, coring, and water-well drilling. They are shown as skid, tractor, and truck-mounted. The booklet presents photographs, engineering drawings, and technical-data tables. **Write or call: Alfred Wirth & Co., Erkelenz (RHLD.), Germany, for more information on rotation drilling machine Booklet BS-100/000/54.**

●

The Axelson Line of Hydrax Hydraulic-Pumping Units are described and specifications given in this bulletin. Included are the 4-ft. Jr., the 6 and 10-ft. units, the 10-ft. counterbalance unit, the long-stroke (26½ ft. counterbalance), the dual unit (which pumps two wells hydraulically from a single oil and power source), and the double ram for pumping low-gravity crude oil. **Write or call: Alexson Manufacturing Co., 6160 South Boyle Avenue, Los Angeles 58, Calif., for the Hydrax pumping-unit bulletin.**

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EQUIPMENT MEN . . . in the News

Birdwell's Tenth Station Is Opened at Wooster, Ohio

A new service for oil, gas, and salt-well production industries in Ohio has been established by Birdwell Surveys in Wooster, Ohio. Ohio territory covered from this station extends as far as Findlay, Cleveland, Columbus, Newark, and Zanesville.

Donald F. Tanner is station manager in Wooster. Formerly stationed in Paintsville, he has been with Birdwell Surveys 10 years. Equipment is operated by William W. Harding who has been transferred from Parkersburg.

Okeson's Appointment To NGSMA Board Is Confirmed

J. B. OKESON

The board of directors of Natural Gasoline Supply Men's Association has confirmed the appointment of J. B. Okeson, vice president, Refinery Supply Co., Tulsa, as a board member of the association, according to Miller W. Conn, president of NGSMA and head of the Market Development Division, Phillips Petroleum Co.

Okeson is to serve out the unexpired term of Ray R. Bush, who resigned from the board in favor of Jimmy Dvoracek, Rockwell's representative in Houston.

Refinery Supply Co. is a manufacturer and distributor of instruments and apparatus for the petroleum, natural gas, and gasoline markets. It is a sister company of Central Scientific Co. and a wholly owned subsidiary of CENCO Corp., Chicago, Ill.

Food Machinery Acquires Shares of Oil Center Tool

An agreement whereby the outstanding shares of Oil Center Tool Co., Houston, will be acquired by Food Machinery Corp., San Jose, Calif., has been announced by John F. Maher, O-C-T president. The agreement is subject to the approval of public agencies.

By virtue of the fact Food Machinery will exchange 90,000 shares of its stock, currently valued at nearly $6,000,000 for the outstanding shares of O-C-T, Maher will become the largest individual stockholder in Food Machinery Corp. He owns approximately 60 per cent of the outstanding O-C-T stock.

Maher is to remain as president of O-C-T, a leading producer of christmas trees and other well control equipment for the oil industry. There will be no changes in personnel or operating policies when the acquisition is finalized.

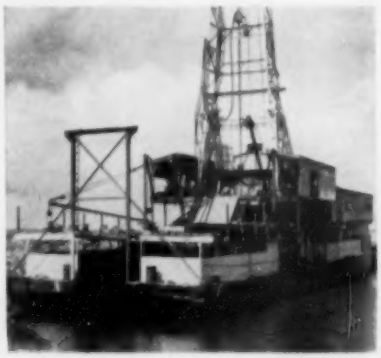
Consolidated Dedicates Engineering-Research Center

Consolidated Electrodynamics Corp., Pasadena, Calif., cut the traditional ribbon across the entrance to its $1.5-million 130,000-sq. ft. engineering and research center by electronic means at dedication ceremonies held recently.

Speakers were Dr. Alan I. Waterman, director of the National Science Foundation; Philip S. Fogg, chairman of the board, Hugh F. Colvin, president, and Franklin H. Donnell, financial vice president, all of Consolidated; and Clarence A. Winder, representing the board of directors of the city of Pasadena.

In addition to the engineering and research center and a two-story annex to the main building, Consolidated has four other plants, three in Pasadena and one in Rochester, N. Y. It will begin construction next year on two additional 130,000-sq.-ft. buildings on the Monrovia Airport property.

American Marine Finishes Inshore Drilling Barge



The Miss Ethel, an inshore drilling barge recently completed by American Marine Corp. of New Orleans, was accepted by the owners, Richardson & Stewart Co., represented by Tom Stewart, president of the company, and Tom Gauger, vice president.

The drilling equipment was assembled and furnished by National Supply Co. as a Type 130 Ideal Consolidated rig, rated for drilling to a 16,000-ft. depth.

A feature of this rig is the completely enclosed generator room on the machinery deck, which houses the generators and switchboard necessary for powering auxiliary drilling equipment and ship's service.

Lypta Appoints Armer; Expands Crane Production

Lypta Co. of Houston has announced an expansion program which will quadruple its production facilities of overhead cranes and hoisting equipment. Harry R. Armer, who has held various key positions in the fabricating industry, has been named general manager of Lypta.

At its plants, Lypta is adding new fabricating facilities, machine-shop area, and more personnel. The new production schedule will be in effect by March 1957.

A key part of the new Lypta program is a complete service department to handle crane needs of customers on an immediate basis. Another division includes an engineering service whereby qualified engineers are available to work with customers in developing crane-handling systems.

Armer was formerly president of Lawson & Armer Fabricating Co. and also is an independent oil operator.

W-K-M Is Host to A.P.I. Pipeline School

Officials of W-K-M Manufacturing Co. of Houston were hosts to a group of students from the A.P.I. Transportation Division School of Pipeline Technology which was held recently in Baytown, Tex.

The group of 45 students, pipeline and refinery executives, superintendents and engineers, represented such companies as Gulf Refining Co., Sun

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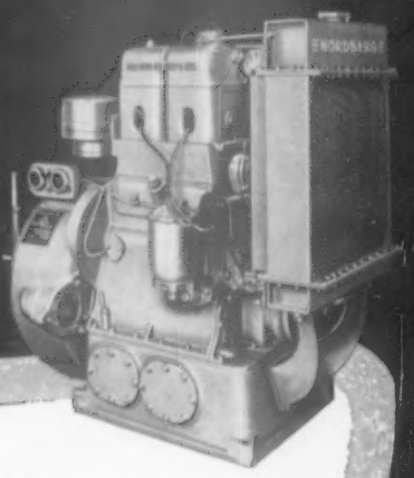

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In keeping with plans to greatly increase the scope of service throughout the oil fields, Nordberg is pleased to announce the appointment of *Fred E. Cooper, Inc.* for the sales and service of Nordberg *Power Chief* Diesel and Gas Engines throughout all oil producing areas.

Backed by the well-known Cooper field service organization, and with parts stocks strategically located, Nordberg *Power Chief* Oil Field Engines will now, more than ever, be your best buy for production pumping and other oil field power jobs.

These heavy duty, medium speed engines are presently offered in 1 and 2-cylinder gas burning units up to 36 hp max., and in 1, 2 and 3-cylinder Diesel units from 10 to 45 hp.

For further details, contact your nearest Fred E. Cooper office, or write: *Nordberg Mfg. Co., Milwaukee, Wisconsin.*

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Pipe Line, Shell Oil, and Texas Eastern Transmission Co. Many foreign countries, including Iran, Brazil, and Bolivia, were represented. The students were given a 3-hour tour through the W-K-M plant. Guides explained the advantages of the W-K-M through conduit gate valve, and working models were shown to help explain the operation of the valve.

R. L. Carruthers, training supervisor with Shell Pipeline Corp.; E. J. Huber, school coordinator, University of Texas; and Morgan Martin, engineer with Gulf Refining Co., were among those who arranged the tour with W-K-M.

Manning Named President Of Sperry Western, Inc.

Election of Robert B. Manning, formerly vice president and treasurer of Sperry Western, Inc., to the presidency of that firm has been announced by J. B. Farwell, chairman of the board.

Since 1954 Manning has been assistant to the president and products manager of Sperry Products, Inc., of Danbury, Conn., of which Sperry Western is a subsidiary. Manning will continue to hold this position.

Prior to joining Sperry, Manning was assistant to the president of Staso Milling Division of Central Commercial Co. and chief engineer of Howe Scale Co.

In addition to the appointment of Manning as president, naming of Clinton R. Hilliker as operating manager and a director of the company was announced by Farwell.

Girdler and Tube Turns Name Andes Ad Manager

Everett A. Andes has been appointed advertising manager of The Girdler Co. and Tube Turns, Louisville, Ky. The announcement was made by Gene Wedereit, director of advertising of National Cylinder Gas Co., Chicago, the parent organization.

Andes served for 12 years as an advertising typographer and consultant in the printing and publishing field in Cincinnati, Chicago, and Louisville. He was advertising production manager of Farson, Huff & Northlich, Louisville advertising agency, when he resigned in 1947 to join Girdler and Tube Turns in the same capacity.

Lunkenheimer Appoints Garrison to Sales Post

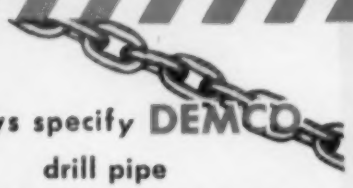
W. B. (Britt) Garrison has been appointed sales representative for Lunkenheimer Co. of Cincinnati, Ohio. His appointment was announced by Melvin W. Pauley, vice president in charge of sales.

Garrison was with Crane O'Fallon Co. and Moorlane Co., both of Denver, prior to his appointment by Lunkenheimer. He will be quartered in the Lunkenheimer sales office in Denver and will travel throughout the Rocky Mountain territory.

Los Angeles Nomads Induct Two New Members

Standing between Tom Martin of R. J. Eiche & Associates, ritual master (left), and Bill Brooks of Byron Jackson Tools, Inc., sergeant-at-arms, are the two latest members of the Los Angeles chapter of Nomads being inducted at a recent meeting of the chapter. To the left is Lee Wardle of Globe Oil Tool Co., regular member, and to the right Ray Faulk of H. C. Smith Oil Tool Co., associate member.

for GREATER gripping power



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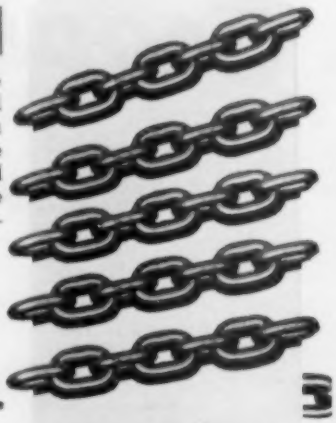

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Facilities of Houston Pipe Added to Flori Pipe

One of the largest pipe-fabricating operations in the country was created when Houston Pipe & Steel, Inc., joined forces with Flori Pipe Co. of St. Louis as a combined operation of their parent company, Sparton Corp. of Jackson, Mich., formerly the Sparks Withington Corp.

The Flori Pipe Co. and Houston Pipe & Steel will function under a single administrative head with unified sales and quality-control staffs located at the St. Louis headquarters.

The Houston operation is conducted on an eight-acre plant site housing five buildings. The main shop, 550 ft. long, has an operating floor space of 50,000 sq. ft. There is an additional shop with 12,000 sq. ft. devoted to production and a 4,000-sq. ft. warehouse.

Brown Manages New Welex District at Cortez, Colo.

JACK E. BROWN

Jack H. Smith, manager of the Rocky Mountain division of Welex Jet Services, Inc., has announced the opening of a new servicing location at Cortez, Colo. Jack E. Brown will manage the new district office, which will serve oil producers in the Four Corners area.

The new Welex office in Cortez is the company's fourth location to be opened in the Rocky Mountains. Other locations include Farmington, N. M.; Fort Morgan, Colo.; and Kimball, Neb. The Rocky Mountain Division office is in Denver.

Brown was transferred to Cortez from the Farmington district where he served as assistant manager. Prior to moving to Farmington, Brown was a research engineer in the Welex research department and in Houston worked as a rigman.

National Supply Opens New Store at Denver City

The National Supply Co. has opened an enlarged and improved oil field supply store at Denver City, Tex.

Located on state route 328, about a quarter mile from the company's former store, the new building includes a modern sales room, a large warehouse, a pump shop, and offices for store personnel. It is double the size of the former store, which was opened in 1939.

Wayne D. Nelson is the manager. The store is under the supervision of Dwight L. Triplitt, district manager of the Hobbs district.

Galloway Will Expand Beaumont Plant, Equipment

Galloway Pipe Guard Co. of Beaumont, Tex., will launch an $80,000 expansion program to improve plant and equipment facilities. Result of this expansion will be a new service in internal pipe coatings for Gulf Coast producers. The company now applies Galloway Pipe Guard No. 1, an internal pipe-coating material which protects oil-field pipe against paraffin deposits and corrosion.

The announcement of expansion was made by Odis Galloway, president of the Beaumont corporation. New equipment to be installed includes 30-ft. ovens in which coated pipe will be baked to fuse and cure the inner coated surfaces. Galloway also mechandises a dump bailer for the economical treatment of pipe against corrosion.

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COLD SIZING—The tubing is then squeezed by a series of rolls which insure accurate size to fit the tolerance requirements of tube sheet holes. This operation is typical of the exacting procedures designed to insure Heat Exchanger Tubing of uniform size, roundness, concentricity and, above all, dependability. Every step in the manufacture of Republic Tubing is based on over 50 years of practical experience.

Heat Exchanger Tubes dependable service

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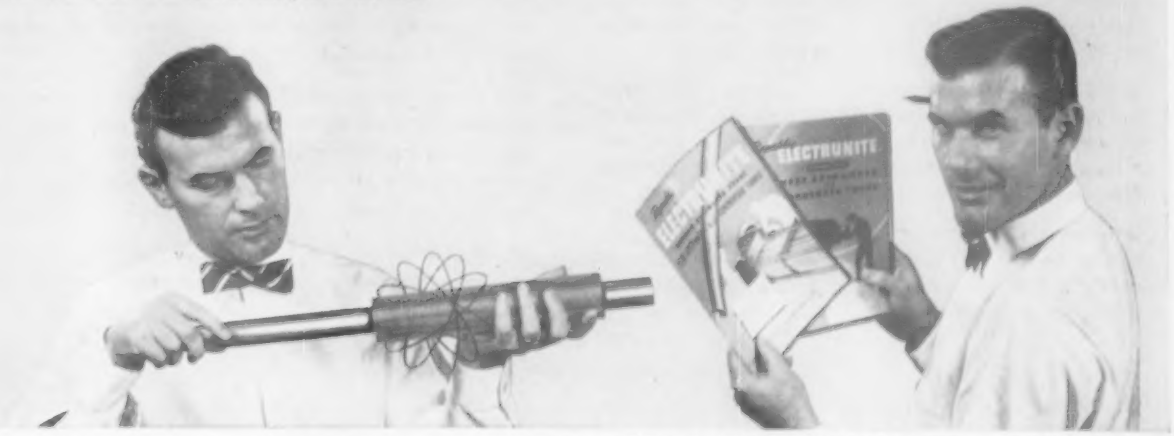

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EXPLORATION

New Strike Accents Enormity of Uinta's Oil Reserve

by Frank J. Gardner

Havenstrite Oil Co.'s recent oil discovery at Ute Trail enhances the future of the Uinta basin as a major oil province.

IT'S a little ironic that the one basin holding the largest known reserve of petroleum in the world has received the least amount of exploratory attention via the drill. It's the Uinta basin, in the northeast corner of Utah. Maybe you didn't know it, but this one relatively small basin (as basins go) holds anywhere from 400 to 600 billion barrels of oil. And it's not buried 5,000 ft. underground. It sits on the surface of the earth. You can pick it up, feel it, squeeze it. And you can mine it to untold depths.

Now that's more oil than has been discovered in all the world by the drill. But it's never been commercialized, because its extraction from the entrapping sands and shales would cost so much that it couldn't compete with oil-well oil. Up until now, that is. Experiments now going on, both in Colorado and in Utah, are aimed at making it competitive. Up in Alberta, similar experiments are being aimed at the great Athabasca Tar Sands, another 300-400 billion barrels reserve in sand at the surface.

Billions of barrels . . . Take a look at these estimates: the bituminous sandstones along Utah's Book Cliffs, on the south edge of the Uinta basin, are credited with a recovery of 94 per cent, for an estimated reserve of 1.5 billion barrels. Along Asphalt Ridge, southwest of Vernal, Utah, are sandstones yielding 96 per cent oil for an estimated recovery of 1 to 3 billion barrels, or 20.5 million barrels per square mile. Solid and semifluid hydrocarbons, such as gilsonite, elbertite, wurtzlite, and ozocerite, plus the world's largest oil-shale deposits in the Green River formation, contain an estimated 400 billion barrels of recoverable oil.

That's on the surface. On the subsurface, nobody knows how many more million of barrels of oil lie undiscovered. Why? Inadequate exploration. There are reasons for that, of course, but they are not reasons that cannot and will not be erased. Remoteness, lack of pipeline facilities, complex geology, unusually waxy oil (with pour points up to 115° F.), high cost of drilling and completion in tough, abrasive rocks, and . . . weather. The only one of those obstacles that can't be conquered by the oil man is weather, but he's even been known to do something about **that** occasionally.

In great oil pools . . . Undoubtedly, Uinta is full of undiscovered oil pools. But it doesn't give away its secrets easily. It's going to take some expert stratigraphic study and imaginative discovery thinking to locate the subsurface traps. Surface geology, photogeology, gravity surveys, and seismograph work have been effective in many instances of discovery, but oil finders feel that the really great pools will be tapped in elusive stratigraphic traps. This means study, research, and **drilling.**

Uinta is different from most basins we know. And therein lies the chief reason the oil finder shied away from it until 1948, when the first oil was found there. It's a structural, topographic, sedimentary basin, filled in on the top with 11,000 ft. of nonmarine Tertiary sediments. Most oil fields are found in marine sediments, but Uinta's oil fields, with one or two exceptions, produce from these Tertiary nonmarines. Below these, there are 10,000 ft. of Mesozoics and 4,300 ft. of Paleozoics that may harbor still more oil.

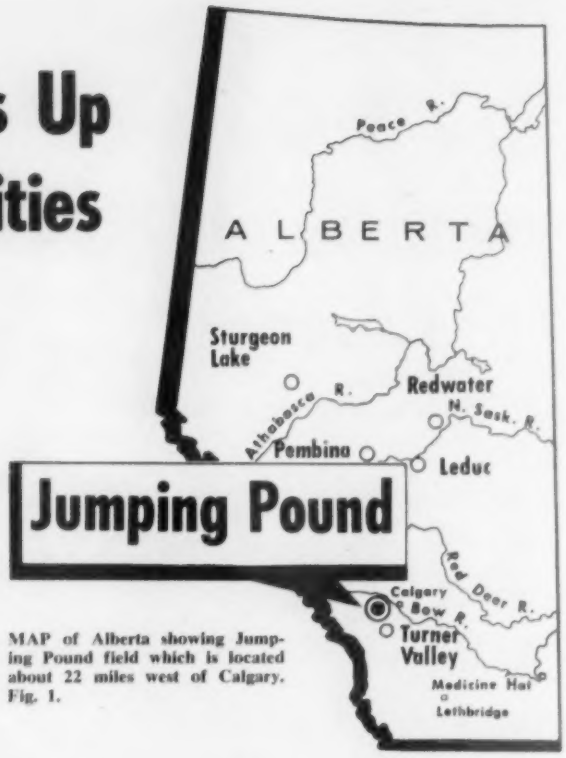
Will unfold the story . . . The story of oil in Utah is yet to be told. It's beginning to unfold in the southeast, in the Paradox basin, and that area has thrust Uinta into the background of late, but the story of **big** oil will be revealed in the Uinta basin. One illustration of this took place recently when Havenstrite Oil Co. moved into the Ute Trail or South Ouray unit, an old Sun Oil Co. prospect, and tested 45 bbl. of oil per hour from a Green River-Tertiary sand at 3,560-80 ft. Sun had drilled two failures here, its Units 1 and 2, to depths of 8,457 ft. and 10,498 ft., respectively. Havenstrite moved in to the same section (Section 22-9s-20e) and drilled its 72-22B Federal to total depth of 3,610 ft., fractured the perforated interval, and recorded a rather spectacular flow. It was enough to project the Uinta region back into the exploration news, and it should be enough to prod action from Utah explorers. Statistics show that 95 per cent of all wells drilled in the basin have had good oil and gas showings, and success ratios on wildcats hold steady at 1 to 10.

So the next time one of these oil-shortage alarmists puts the bite on you, treat him kindly. Take him to the nearest map, point to the northeastern corner of Utah, and ask "What's worrying you? Salt Lake City might be the oil capital of the world in 1975!" **End.**

It's complicated geology but . . .

Jumping Pound Points Up Foothills Belt Possibilities

by Rudolf Martin



MAP of Alberta showing Jumping Pound field which is located about 22 miles west of Calgary. Fig. 1.

JUMPING POUND gas field is situated in the Foothills belt of the Rocky Mountains, near the eastern edge, some distance north of Turner Valley oil field and about 22 miles west of Calgary (see Fig. 1).

The field area is some 12 miles long and it extends in a south-southeasterly direction from west of the Fifth Meridian. The two northernmost wells, Units 13 and 14, lie north of the Bow River and on either side of the Calgary-Banff Highway. The width of the field varies from approximately ½ to 2 miles; it consists of only one row of producing wells spaced approximately 1 mile apart. Of the 14 wells drilled by Shell Oil Co. of Canada, Ltd., since 1945, 11 are flowing gas wells, 2 are marginal gas wells abandoned as noncommercial (Units 3 and 8), and 1 (Unit 2) is dry and abandoned.

The surface geology of the area was mapped by G. S. Hume, Geological Survey of Canada, and was published by the Department of Mines and Resources (1941). The surface structure consists of numerous NNW-SSE trending imbricate Upper Cretaceous thrust blocks, bounded on the east by the Jumping Pound thrust fault, which in this area forms the approximate eastern boundary of the Foothills belt. A short distance to the west of the outcrop of the Jumping Pound thrust fault, the Upper Cretaceous forms an asymmetrical front fold which was the objective of much early drilling.

Below the Jumping Pound thrust fault, structural conditions are very different. The producing formation, the porous dolomite of the Turner Valley formation of the Mississippian Rundle group (mostly referred to as the Rundle), is affected by thrust faulting, too, but to a considerably lesser extent than the overlying Cretaceous. Overlying a sole fault, at least two thrust blocks have been recognized within the gas-producing area; the underthrust Mississippian and Devonian below the sole fault are water bearing.

Topography

The scenery of the Jumping Pound area is fairly typical of the Foothills belt, being marked by a series of parallel ridges and valleys with a NNW-SSE trend, conforming with the strike of the strata and roughly parallel to the mountain front to the west. The maximum relief is approximately 1,700 ft., with elevations ranging from 4,000 ft. above sea level in the east to 5,700 ft. in the west.

History of Development

Drilling in the Jumping Pound area began in 1914 with Purity Oil Co.'s No. 1 well, in the northern part of the present field, which reached a depth of only 1,255 ft.

Northwest Co. and others drilled four wells in the southern part of the area from 1914 to 1921. At the end of 1939 a total of nine wells had been drilled with the objective of testing the Upper Cretaceous of the front fold and the other imbricate fault blocks overlying the Jumping Pound thrust fault, the deepest of which was Brown Consolidated 1 Rabson (6,885 ft.). All these wells were abandoned.

Following the publication of a cross-section by Hume (1940) which indicated the possibility of finding favorable structural conditions in the Mississippian, below the Jumping Pound thrust fault, a seismic survey of the area was undertaken by Shell Oil Co. of Canada, Ltd.

Some seismic work had been done previously for Rabson Oil Co., Ltd., and its associates, who at that time largely controlled the acreage. In 1942 Shell acquired the petroleum and natural-gas rights held by Rabson.

On the basis of the seismic results, the discovery well No. 4-24-J (later renamed Unit 1) was drilled in 1944 and successfully completed as a gas-condensate well in the Rundle, the top of which was encountered at 9,618 ft. (5,598 ft. below sea level).

This was followed by the drilling of Units 2 and 3 along a dip section extending southwest from the discovery well. Unit 2 found the Rundle too far downdip and below the water table, and Unit 3 subsequently established the gas-water contact at 6,436 ft. subsea. Unit 4 drilled to the southeast and on strike with Unit 1, was drilled through the sole fault into the underthrust Mississippian and Devonian, both of which were found to be water bearing.

Meanwhile, the field was unitized in 1954 under the terms of the Jumping Pound Unit Agreement, made between Crown and Shell, and joined by almost all of the freehold lessors and royalty owners in the area. The unit area is some 16 miles in length and varies from 1½ to 2¾ miles in width; its total area is 18,833 acres.

After the completion of Unit 4 in 1947, development ceased until a market for the gas became available in 1950. Thereafter 1-mile stepouts were

drilled to the northwest and southeast of Unit 1 along this approximate crest of the structure, Unit 14 being the last well completed to date.

One of these wells, Unit 8, which encountered only 19 ft. of Rundle carbonate above the sole fault, was drilled to the underthrust Mississippian and Devonian, however with equally disappointing results as Unit 4. The remaining wells were all bottomed in the Black Lime underlying the Turner Valley formation.

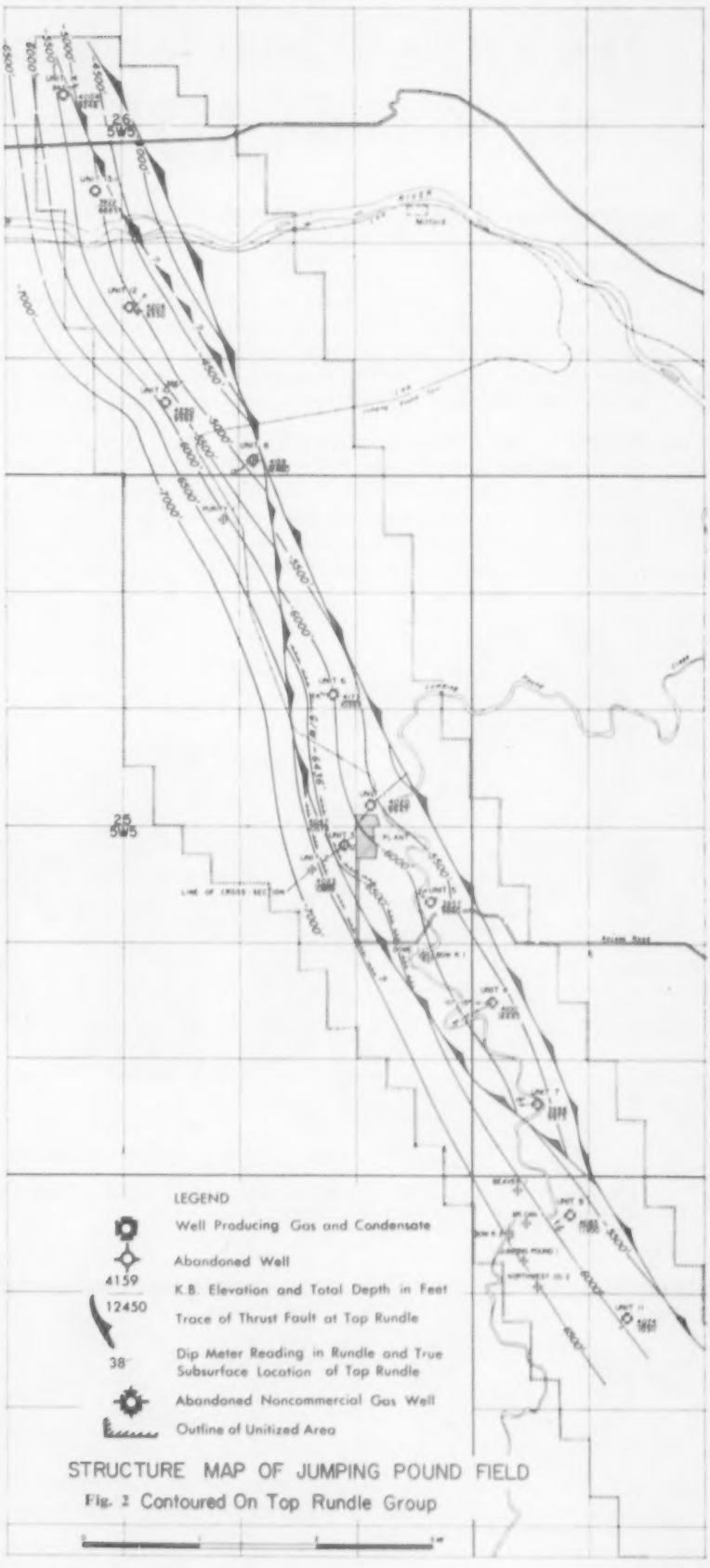
Construction of the gas plant began in 1950 and the plant went on stream in May 1951, and with the subsequent gradual increase in demand the processing facilities have been expanded twice.

Stratigraphy

The Cretaceous formations of the Jumping Pound area are well known from the surface exposures, as mapped by G. S. Hume (Department of Mines and Resources, 1941). In addition, these and the deeper formations down to the Devonian were penetrated in various wells drilled in the area, some of which were sampled with great care, and the cuttings examined in conjunction with the electric logs.

The repetition of strata by thrusting and the distortion of their true thicknesses by steep dips present a considerable handicap to attempts to establish the normal sequence.

Douglas (1953), in a preliminary note on the Carboniferous stratigraphy of the southern foothills, suggested that the productive zones of Jumping Pound field do not occur in the same interval as those of Turner Valley field, but are developed in the Mount Head formation. In our opinion, however, the productive beds in Jumping Pound field



STRUCTURE MAP OF JUMPING POUND FIELD

Fig. 2 Contoured On Top Rundle Group

THE AUTHOR

Rudolf Martin is area production geologist, Shell Oil Co., Calgary, and has held this position since April 1955. After obtaining his Ph.D. in 1936, he joined the Royal Dutch - Shell Group and spent most of the next 18 years in South America, principally Venezuela and Colombia. His assignments included field geology in Colombia and Venezuela, subsurface geology in North Texas, Kansas, western and eastern Venezuela, Colombia and Indonesia, and concession evaluation work in Venezuela. He studied at Leiden University where his grandfather, Dr. K. Martin, had been professor of geology for 45 years.

This article was first published in the guidebook for the Sixth Annual Field Conference, Alberta Society of Petroleum Geologists, August 19, 1956.

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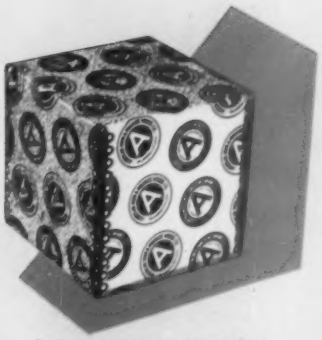
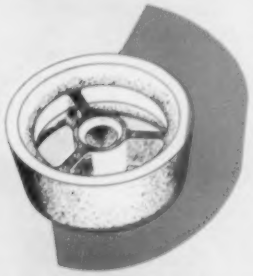
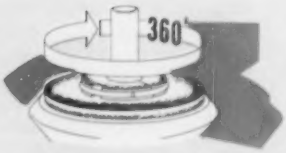


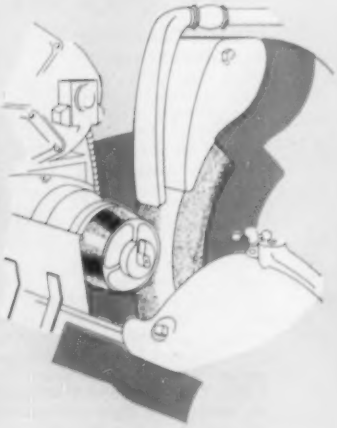
Packaged for easy storage in the supply house . . . and protection against rough treatment and weather in the tool house.



Three-web design of American Iron Valve Seats enables seats to absorb terrific pounding of modern high pressure pumps while providing maximum fluid passage.



Split-ring retainer is standard equipment. This retainer gives 360° support to insert, preventing chipping or cracking of rubber compound.



American Iron Seats are precision ground for perfect seal in pump port. No other production method gives the perfect seating surface as this automatic honing machine.

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STRATIGRAPHIC CHART

Age and formation—Lithology—	Average thickness (ft.)
UPPER CRETACEOUS:	
Edmonton—Sandstones, shales, and coal beds	Unknown
Belly River—Sandstones, shales, conglomerates, and coal	1,200+
Wapiabi (formerly Upper Alberta)—Shales and shaly sandstones. Includes the Highwood sandstone and the first White Specks marker	1,350
Cardium—Sandy shales. Includes the Cardium sandstone	250
Blackstone (formerly Lower Alberta)—Shales and sandy shales. Includes the Jumping Pound sandstone and the Fish Scale sandstone. Grit bed at the base	750
LOWER CRETACEOUS:	
Upper Blairmore—Nonmarine sandstones and shales	650
Lower Blairmore—Limestones, shales, and siltstones, possibly lacustrine in part, with the Dalhousie sandstone at the base	250
Unconformity	
Kootenay—Nonmarine sediments, comprising coaly shales, and siltstones	100
JURASSIC:	
Fernie—Brown sandstone — represents a transition from nonmarine to marine sediments. Marine shales, containing a Belemite zone and glauconite towards the base	
Unconformity	
MISSISSIPPIAN:	
Rundle Group (formerly Madison)	
Mount Head—Absent in most wells as a result of erosion	Up to 13
Turner Valley—Gas-producing dolomite, subdivided into:	
Upper porous—containing a number of streaks of varying porosity, not concentrated in one main horizon as in Turner Valley	43
Middle dense—represents the dense zone between the two producing zones of Turner Valley	64
Lower porous—equivalent to the lower porous zone of Turner Valley	136
Shunda—Dark limestone (black lime marker) at the top, followed by anhydrite and dolomite	230
Pekisko—Limestone	300
Banff—Shales	500-600
Exshaw—Carbonaceous shale	30
DEVONIAN:	
Upper and middle Devonian—Anhydritic dolomite	*2,000

*Penetrated in Unit 4.

correlate with the Turner Valley formation.

The gas accumulation is found primarily in the upper and lower porous zones. Varying thicknesses of pay occur also in the intervening middle dense zone. This latter zone is characterized by a higher proportion of shale than the other two, although in some wells in the northern part of the field the total pay in the middle dense is approximately equal to that in either of the other two.

The total net pay as estimated from cores and logs ranges from 95 to 165 ft. in the individual wells, with an average of 140 ft. The details of the pay zone for well Unit 10 and its characteristics as determined from core data provided by the same well are given below:

CORE DATA

	New pay (ft.)	Average porosity (per cent)	Average permeability (Md.)	Porosity × ft.	Permeability × ft. (Md.-ft.)
Upper porous	17.2	6.4	28	1.10	474
Middle dense	21.6	7.1	9	1.54	192
Lower porous	106.2	9.1	55	9.65	5,880
Total	145.0	8.5	45	12.29	6,546

The average porosity of the net pay for the whole field is 8.2 per cent. The true over-all reservoir permeability, as derived from bottom-hole pressure buildup data, averages about 4 md. rather than the 45 md. indicated by the above core data for well Unit 10. An average connate water saturation of 10 per cent has been calculated from core analyses and electric logs.

Structure

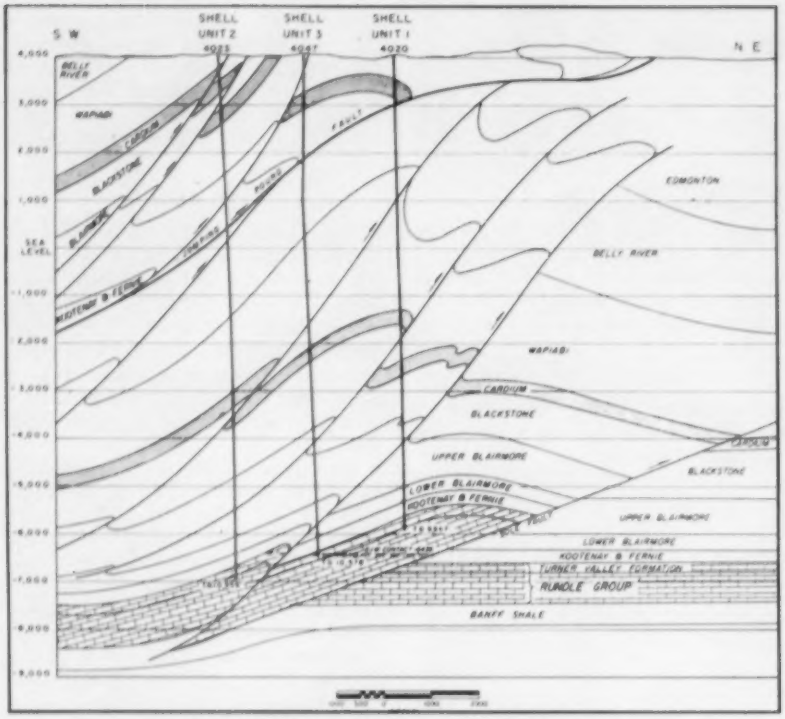
The surface geological features of the Jumping Pound area are quite similar to those of Turner Valley, which adjoins it to the south. A great number of parallel NNW-SSE string thrust faults separate the Upper Cretaceous sequence into steeply westward dipping thrust blocks, many of which have a core of erosion-resistant Cardium sandstone.

The eastern limit of this imbricate zone, and approximately of the Foothills belt in general, is formed by a major westward dipping fault, the Jumping Pound thrust fault, which runs more or less parallel to but about 6 miles to the east of the Turner Valley surface anticline.

A short distance to the west of the outcrop of the Jumping Pound thrust fault, the beds of the Upper Cretaceous form an asymmetrical front fold, which is broken up by subsidiary thrust faults. This anticline, which is thus a northeast offset to the Turner Valley anticline, although bearing a superficial resemblance to the latter, is in effect quite different at depth. It involves only Cretaceous beds above the Jumping Pound thrust fault. In some of the older wells on the west flank the fault plane coincides with the top of the Jurassic Fernie formation.

Below this fault, the cross-section (Fig. 3) shows four more steeply westward dipping thrust blocks involving Cretaceous beds, separated by faults steeper than the apparently overriden by the Jumping Pound thrust fault. The Cretaceous beds involved in these fault blocks vary in dip from 10° to 64°.

Deeper still, the Jurassic and Mississippian are found to be affected by a well-marked thrust fault of considerably lesser inclination than the overlying faults, which has been traced by reflection seismic surveys over a considerable distance. This sole fault separates the gas bearing overthrust Rundle from the undisturbed underthrust block, which was penetrated in wells Units 4 and 8, but found to be water



CROSS-SECTION of Jumping Pound field. Fig. 3.

bearing in both the Mississippian and the Devonian formations.

The top Rundle is this block occurs at around 6,600 ft. subsea; its structural attitude is close to horizontal. The sole fault has not been traced in surface outcrops and appears to be absorbed in the shales of the overlying Cretaceous.

The overthust Rundle has been encountered at depths ranging from 4,832 (Unit 8) to 6,616 ft. subsea (Unit 2). It is complicated by subsidiary thrust faulting which may be connected with at least one of the steep faults affecting the overlying Cretaceous. Duplications of section have been registered in various wells from as deep in the stratigraphic sequence as the Black lime to as high as the upper Blairmore.

The simplest picture (Fig. 3) connects all of these into one subsidiary fault of sinuous trace. This, by cutting below the gas-water contact between wells Unit 2 and 3, effectively divides Jumping Pound gas field into three separate reservoirs, with an indication of a possible fourth one at the northern end. However, the initial bottom-hole pressures measured in the south block wells, after considerable previous withdrawals from the central block, were about 190 lb. less than the initial pressure in the remainder of the field, suggesting limited communication between adjoining blocks.

Also of interest in this connection is that pressure buildup data from Unit 12 suggests that the subsidiary fault-

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cutting wells Units 14 and 13 may extend southward past the first well.

Drilling and Completion Methods

The following is a brief summary of the latest drilling and completion methods that have been used by Shell Oil Co. of Canada, Ltd., in Jumping Pound Rundle gas field.

Well depths, extending the two holes drilled into the underthrust block, range from 8,963 to 11,100 ft., and average around 9,200 ft. Approximately 3½ months are required to drill and complete an average Jumping Pound gas well.

Approximately 950 ft. of 13⅜-in. surface casing is cemented in a 17½-in. hole. Beginning with well Unit 10, it has been the practice to drill a 12¼-in. hole from under the surface casing using the packed-hole drilling technique (11¼-in. drill collars in a 12¼-in. hole). An oil-emulsion lime-base drilling mud is used and has been found to be very successful in maintaining the hole in good condition, especially in drilling through the first 7,000 ft. of highly disturbed section, which includes several faults and formation dips varying from 10° to 64°.

Intermediate casing strings were required on most wells before the packed-hole and lime-base mud techniques were adopted, but Unit 14, the last well drilled in the field, was drilled to total depth of 9,248 ft. without intermediate casing.

Seven-inch production casing is cemented near the base of the middle dense zone, leaving the lower porous zone open. The 7-in. casing is then drilled out, the upper porous and middle dense zones are perforated, isolated by production packers, selectively acidized, and flow tested through 2½-in. tubing. The lower porous zone is then acidized selectively and the three zones are brought into production together.

In the older wells up to and including Unit 9 (see Fig. 2), 7-in. casing has been cemented at the top of the producing section and completion has been either in open hole (Unit 1 and 4) or with 5-in. liner.

The majority of the wells drilled to date have deviated in a northeast to east-northeast direction. Horizontal deviation ranges in the order of a 1,000 ft. east and 600 ft. north of surface location. For details on the way some of the problems posed by crooked holes were solved, the reader is referred to the article by Booth and Angebrandt (1954).

Accumulation and Production

Although numerous small shows of oil have been reported from the Cretaceous and several of the shallow wells drilled to test the formations above the Jumping Pound thrust fault reported a number of gas shows (in one case flowing 100,000 cu. ft. per day), commercial production is limited to the gas-condensate reservoir in the Turner Valley formation of the Mississippian Rundle group.

The same formation produces oil in Turner Valley field to the south, but in Jumping Pound no oil column has been encountered. The gas-water contact was established at 6,436 ft. subsea in well Unit 3.

The 11 producing wells have theoretical open-flow potentials of between

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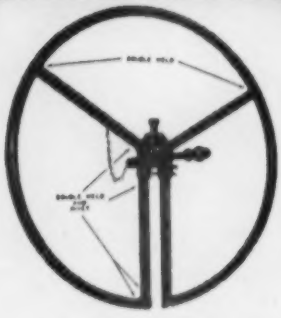

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8 and 34 M.M.c.f.d. averaging 24 M.M.c.f. per well, the field total being 267 M.M.c.f. per day. The total field deliverability into the present gathering system, operating at 1,000 psi. line pressure, is about 160 M.M.c.f. per day.

Cumulative production to June 1, 1956, amounted to 57½ billion cubic feet of raw gas, and total sales to that date were 46 billion cubic feet of pipeline gas. Lack of a market for the liquid hydrocarbon products, particularly during 1954, led to their underground storage in Well Unit 1, which accounts for the fact that no gas was produced from this well during that period.

During 1955 residue gas was injected into well Unit 5 in an effort toward leveling plant operations throughout the year.

The reservoir appears to be of the closed or depletion type. The original reservoir pressure was 3,980 psig. at 5,850 ft. subsea, the original reservoir temperature 194° F.

The crude natural gas is made up of the following constituents (Munn, 1952):

	(Mole per cent)
Methane	84.2
Ethane	3.8
Propane	1.0
Butanes	0.5
Pentanes and higher	0.8
Carbon dioxide	6.2
Hydrogen sulfide	3.5

The wet gas yields 9.3 bbl. of condensate per million cubic feet, which is removed by separation. The hydrogen sulfide, the carbon dioxide and 3.5 bbl. of natural gasoline per million cubic feet are then removed at the gas plant in order to produce a sweet dry gas of pipeline quality.

Bibliography

Booth, W. M., and Angebrandt, F. M., In the Canadian Foothills . . . How Crooked Hole Problems Are Solved; World Oil, Vol. 139, No. 2 (August 1, 1954), pp. 125-132.

Douglas, R. J. W., Carboniferous Stratigraphy in the Southern Foothills of Alberta, Alta. Soc. Petrol. Geol., Third Annual Field Conference and Symposium, pp. 68-88 (pp. 83-84 and Fig. 4). (1953.)

Hume, G. S., Turner Valley Oil Area, Geol. Surv., Canada, Sum. Rept. 1926, Part B.

Oil prospects near Bragg Creek, Alberta; Geol. Surv., Canada, Sum. Rept. (1927), Part B, pp. 1-20 B.

The Highwood—Jumping Pound Anticline With Notes on Turner Valley, New Black Diamond and Priddis Valley Structures, Alberta; Geol. Surv., Canada, Summ. Rept. (1929), Part B.

Structure and Oil Prospects, Foothills of Alberta, Highwood and Bow River; Geol. Surv., Canada, Paper 40-8. (1940).

Jumping Pound: Department of Mines and Resources Map 653A. (1941).

Petroleum Geology of Canada, Geol. Surv., Canada, Economic Geology Series No. 14 (p. 43). (1944).

Developments in Canada in 1944, Amer. Associa. Petrol. Geol., Bull., Vol. 29, No. 6, pp. 654-664 (p. 657). (1945).

Link, T. A., Interpretation of Foothills Structures, Alberta, Canada; Amer. Assoc. Petrol. Geol., Bull. Vol. 33, No. 9, pp. 1475-1501 (pp. 1482-1484); reprinted in Western Canada Sedimentary Basin, Rutherford Memorial Volume, Amer. Assoc. Petrol. Geol., 1954, pp. 355-381 (pp. 361-363). (1949).

Munn, L. T., The Production of Elemental Sulfur From Jumping Pound Natural Gas; Can. Inst. Min. & Met., Bull., Vol. 45, No. 484 (August 1952), pp. 487-488. (1952).

Province of Alberta Petroleum & Natural Gas Conservation Board: In the matter of the Gas Resources Preservation Act and in the matter of a joint hearing to determine various questions relating to the proposed export of natural gas from the Province of Alberta; Session, September 8, 1953, Vol. 37, pp. 2718-2728. (1953).

Rutherford, R. L., Geology along Bow River between Cochrane and Kananaskis, Alberta; Province of Alberta, and Indust. Research Council, University of Alberta, Report No. 17. (1927).

Shell Oil Co. of Canada, Ltd. (1951): The Story of Jumping Pound, 1937-1951; Toronto. (1951).

The Canadian Petrochemical Industry, Ryerson Press, Toronto. (1956).

Acknowledgment

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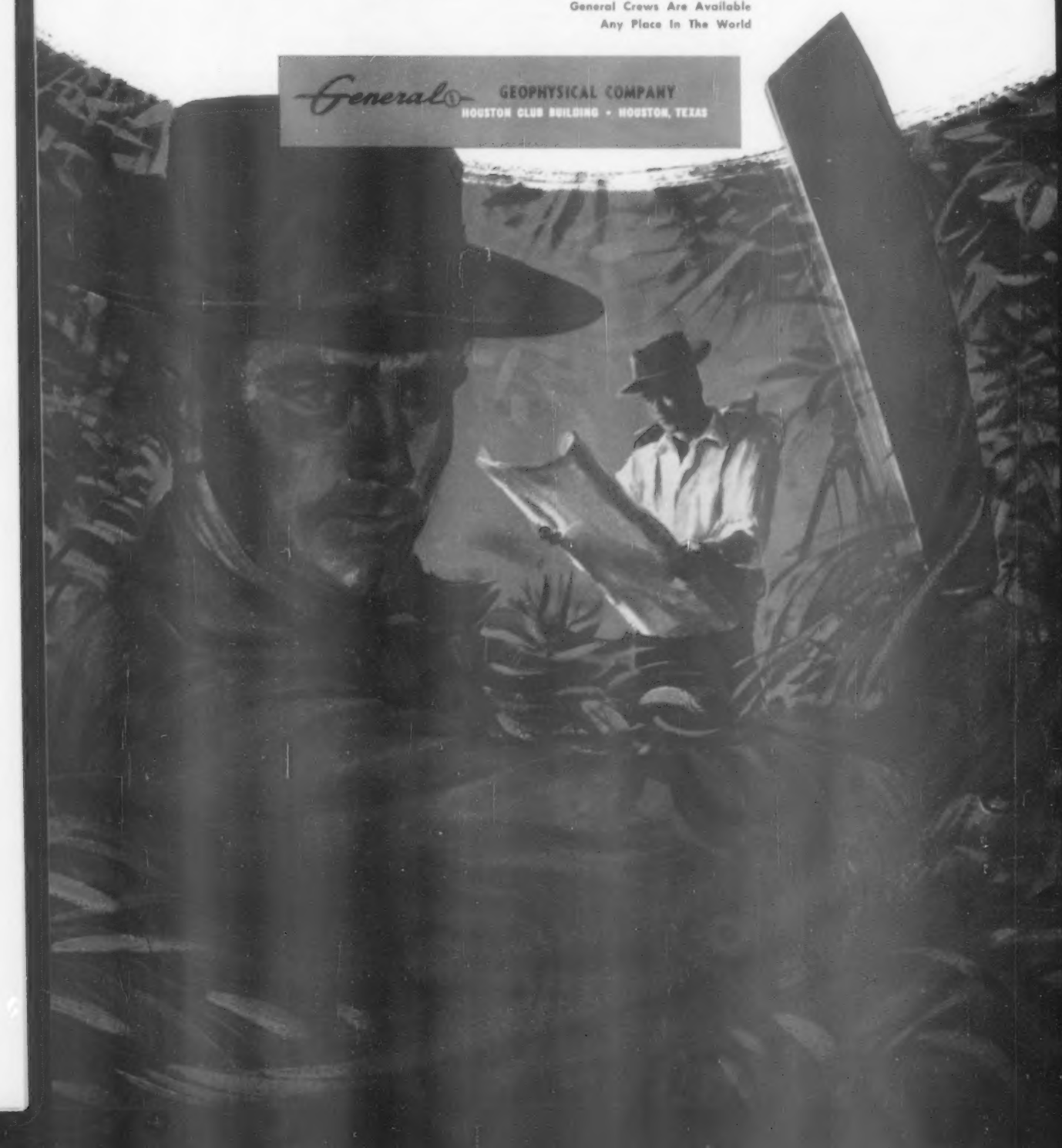

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EXPLORATION HIGHLIGHTS

MID-CONTINENT

OKLAHOMA

New Alfalfa County Discovery Indicated

Barrett Petroleum and Kay County Gas Co. have a Cherokee sand-Pennsylvanian discovery at their 1 Hague in C SE SE 22-27n-11w, Alfalfa County, northern Oklahoma.

The well flowed an estimated 25,000 M.c.f. of gas per day and 20 bbl. of distillate per million from perforations at 5,176-5,220 ft.

Noble Discovery Adds Third Pay Prospect

A third pay sand has been tapped at Anderson-Prichard Oil Corp.'s Noble townsite discovery, the 1 Allison, NE NE SW 27-8n-2w, Cleveland County. A test in the Bromide sand at 7,900-05 ft. flowed 59 bbl. in 6 hours on ⅝-in. bottom choke and 6/64-in. top choke. Recovery was 7,900 ft. of clean oil.

The operator tested through Tulip Creek perforations at 8,210-15 ft., making 76 bbl. of oil in 5 hours on 16/64-in. choke. Recovery was 8,200 ft. of clean oil. The middle McLish sand at 8,565-85 ft. showed oil recovery on swab of 5 bbl. hourly.

KANSAS

Testing Under Way At Northwest Harper Well

Mull Drilling Co., Inc., has opened a new pool in northwestern Harper County, 2 miles northeast of Sharon pool and 4½ miles northwest of Attica, Kans. The 1 Corydell, C SW NW 9-32s-9w, recovered 95 ft. of oil and gas-cut mud and 100 ft. heavily oil and gas-cut mud from the Mississippian at 4,314-33 ft.

Oil Shows Tested At Hodgeman Prospect

H&H Drilling Co. 1 Goebel is an indicated Marmaton or Mississippian discovery for northern Hodgeman County, 7 miles north of Jetmore pool. The wildcat tested shows of oil in the Marmaton or Mississippian. Recovery on a drill-stem test at 4,316-31 ft. was 1,975 ft. of gas and 185 ft. muddy gassy oil.

APPALACHIAN

OHIO

A wildcat in southwestern Washington Township, Cochocton County, came in as a gasser. On L. M. Boal, Lot 22, Clinton sand was logged at 3,422-67 ft. and gaged 550,000 cu. ft. natural. The sand will be fractured before completion by Ohio Fuel Gas Co.

● A semiwildcat completed at McCuneville by Mid East Oil Co. in Salt Lick Township, Perry County, made 40 bbl. after fracture. On Rosetta Gaver, Section 7, the Clinton was found at 3,286-3,365 ft. with a 1-bbl. showing natural.

● The proven area of the New Castle extension was moved ⅓ mile to the east by McCall Drilling Co. 1 Willard Marlott, Lot 16, New Castle Township, Coshocton County. Clinton sand at 3,231-72 ft. had a small showing natural and gaged 50 bbl. after fracture.

WEST VIRGINIA

In Barker district, Barbour County, West Virginia, Godfrey L. Cabot, Inc., 1-1439 Otto Shockey, deep wildcat, elevation 2,035 ft., was dry through the Oriskany sand, elevation 2,035 ft., chert 7,700-7,910 ft., Oriskany sand 7,910 ft., total depth 8,008 ft.

● Licking district, Tucker County, Hope Natural Gas Co. 10012 T. A. Loughrey, elevation 1,714 ft., shut down at a total depth of 4,325 ft. to fracture. Gas encountered at 4,150-59 ft., tested 2,214,000 cu. ft. and blew down to 1,716,000 cu. ft.

PENNSYLVANIA

In Mount Pleasant Township, Westmoreland County, Southwest Pennsylvania, Peoples Natural Gas Co. located a new wildcat test, 4109 B. H. Smithley. It is on the Donegal Quadrangle near the No. 4105 Benedictine Society well. Keta Oil & Gas Co. 1 Victor Schwarer is drilling at 7,838 ft. The Tully was at 7,120 ft., Onondaga 7,800 ft., and the chert at 7,837 ft.

● Pine Township, Indiana County, Pittsburgh Plate Glass Co. 1 Jess Ober reached the Tully at 7,468 ft., Onondaga 8,236 ft., the chert at 8,253 ft., and is drilling at 8,375 ft.

EASTERN KENTUCKY

United Fuel Gas Co. is drilling at 2,156 ft. at their wildcat test 26 Fordson Coal Co. on Trace Fork in Leslie County. Well is one of a number of projected tests for the county.

GREAT LAKES

MICHIGAN

Significance of the 1,980-ft. east extension of the older Edmore Traverse oil pool, Montcalm County, by the E. Edwin Brehm 1 Long estate, NE NW NW 11-12n-6w, may be much greater than would appear on the surface. This new producer, first successful stepout east of this old pool, flowed as much as 25 bbl. of oil an hour natural after well was deepened in additional pay section from 3,089 ft. to new total depth, 3,094 ft. Well filled and was flowing before cable tools could be run back to the surface after additional pay was drilled. Well may also lead the way to considerable new development in this field which was discovered in 1933 and developed immediately thereafter to its limits until this new producer. Brehm and associates will move tools to the diagonal southwest 20-acre offset to this new producer, into the SW NW NW 11-12n-6w, for next start.

Daily Crude Oil Co. original developers of Edmore field, may drill the blank 10-acre offset to its most easterly producer in the pool immediately—the NE NE NE 10-12n-6w.

A new producer on the south-southeast side of Reynolds Reed City zone oil pool, Montcalm County, developed natural flowing oil production at a point below which water has shown at other test wells in the field.

This new well, which flowed at the rate of 100 bbl. of oil a day natural, with no water showing, while tubing was being run was Swan-King Oil Co., Basin Oil Co. and G. Ackermann 1 Weatherby, SE SW SE 7-12n-9w. Well had been flowed previously through 5-in. casing at the restricted rate of 60 to 70 bbl. of oil a day. Dundee top was logged at 3,293 ft. Pay showed at 3,340-41 ft., just a normal interval below top of Dundee in the pool.

Exploration this week

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WEST TEXAS-NEW MEXICO

WEST TEXAS

Terry County Devonian Discovery Is Completed

West Central Terry County gained another Devonian pool at Anderson-Prichard Oil Corp. 1 Waters, in 118-D11-C&M Survey. On potential test the well flowed 226 bbl. of oil a day

Anderson-Prichard 1 Waters has opened a new pool in Terry County. Coroco, South, nearest production, is also Devonian.

through 11/64-in. choke from final perforations in the Devonian at 12,745-63 ft. Gas-oil ratio was 333:1; tubing pressure was 120 psi.

No. 1 Waters entered the Devonian at 12,750 ft., or minus 9,320 ft. It had good oil and gas shows in the Spraberry, around 8,300 ft., and in the Pennsylvanian at 11,328 ft.

Location is 9 miles southwest of Gomez, 2¼ miles west of Coroco, South (Devonian) field, and 2½ miles northwest of The Texas Co. 1 Black, recent Devonian discovery.

McKee Opener in Pecos

Another McKee discovery for northern Pecos County has been completed southeast of Imperial.

Republic Natural Gas Co. 1 Arthur Duval, 1-3-H&TC, flowed at the rate of 562 bbl. of 43° oil a day through 28/64-in. choke. Gas-oil ratio was 863:1. Tubing pressure was 750 psi. Pay section was perforated between 5,490-5,530 ft.

The new well is about 2½ miles south of recent McKee discoveries on the west flank of the Abell areas. Top of the McKee was 5,285 ft. on estimated elevation of 5,285 ft.

TXL San Andres Opener

TXL Oil Corp. 1 Ector "J," wildcat 7 miles north of Notrees in northwestern Ector County. Location is about 1 mile east of TXL-Ellenburger field.

Flowing potential was 69 bbl. of oil through 24/64-in. choke, from San Andres perforations at 4,266-4,340 ft. Tubing pressure was 300 psi. and gas-oil ratio was 2,900:1. The well is in approximately SW NE Section 19, Block 45, T1N, T&P Survey.

SOUTH LOUISIANA

LOUISIANA OFFSHORE

West Delta Area Yields Another Good Discovery

California Co. has another oil-field discovery in the busy coastal waters bordering Mississippi River's Southwest Pass, at Plaquemines Parish's delta tip.

It is in Block 83, West Delta area, just off the west side of the pass, and about 2 miles southwest of Continental Oil Co.'s West Delta Block 53 field.

Discovery well, 2 State Lease 2593, was drilled to 11,800 ft., but produces from casing-perforated pay at 10,172-86 ft. It tested at the rate of 389 bbl. of 33.5°-gravity oil per day through 5/32-in choke. Flow was under pressure of 1,760 psi. and had a gas-oil ratio of 712 cu. ft. per barrel.

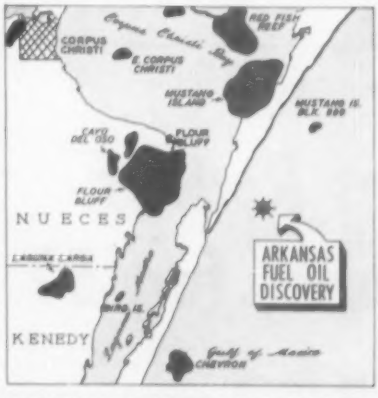
SOUTH TEXAS

TEXAS GULF COAST

Texas' Seventh Gulf Field Opened off Nueces Coast

Additional incentive for exploration in the Gulf of Mexico off the Texas coast was given last week by Arkansas Fuel Gas Corp.'s completion of a gas-condensate producer in its wildcat in State Tract 905, about 2½ miles off the coast of Nueces County.

It opens the Texas coast's seventh offshore field. Location is 7 miles down the coast from Gulf Oil Corp.'s Mustang Island Block 889 field, nearest offshore production, and 13 miles northeast of Standard Oil Co. of Texas' Chevron field, off the Kleberg County shore. It is 8 miles southeast of Flour Bluff, on the mainland.



LOCATION of Arkansas Fuel Oil Corp.'s discovery well in Gulf of Mexico off Nueces County, Texas.

The well has an open-flow potential rating of 15,600,000 cu. ft. of gas per day with a condensate recovery of 17 bbl. per 1,000,000 cu. ft. Production is from perforated interval at 7,659-74 ft. in hole drilled to 10,200 ft. Gravity of the fluid is 63.5°. Shut-in pressure is 2,829 psi.

HUGOTON EMBAYMENT

TEXAS PANHANDLE

Hansford Adds New Tonkawa Discovery

Shamrock Oil & Gas Corp. 1 J. K. Steele et ux "F," northeastern Hansford County, is a new Tonkawa gas producing area 8 miles northeast of Gruver town.

The discovery flowed 980 M.c.f. of gas per day on potential test from perforations at 5,366-76 ft. Location is in Section 66, Block 45, H&TC Survey.

Dual Completion Reported At Hutchinson Strike

The Texas Co. dually completed its 1 Johnie Close, 12 miles northeast of Pringle in north-central Hutchinson County, just south of the Hansford County line in Section 16, Block 3, SA&MG Survey.

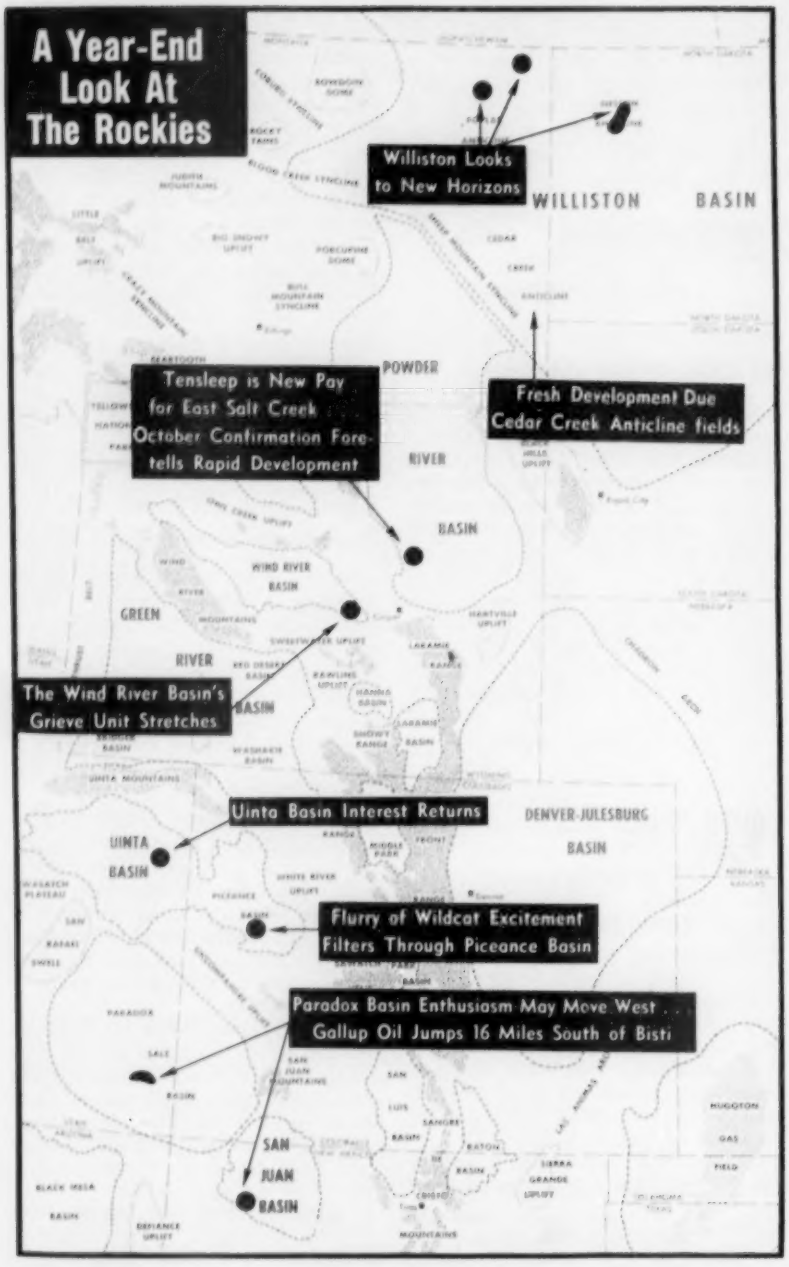
The well flowed 5,010 M.c.f. of gas per day on 10/25-in. choke on 2-in. tubing from perforations in the Virgil sand at 4,910-22 ft.; it made 5,660 M.c.f. per day on 2-in. tubing from perforations in the Cleveland sand at 5,890-5,902 ft.

NORTHWEST OKLAHOMA

Woodward County Bags First Production

A remote Union Oil Co. of California wildcat in Woodward County, southeast of the city of Woodward, is that county's first producing well. The 1 McCormick, SE SE NW 14-22n-20w, has about 40 ft. of effective pay zone in the Morrow-Pennsylvanian.

Perforations at 8,232-44 ft. tested 3,880 M.c.f. of gas. The maximum flow capacity of the well is estimated to be between 50,000 and 100,000 M.c.f. per day with distillate. Union will request 640-acre spacing, and has already begun drilling at 1 Sherman in SE SE NW 13-22n-20w.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Flurry of Wildcat Excitement Filters Through Piceance Basin
Paradox Basin Enthusiasm May Move West . . Gallup Oil Jumps 16 Miles South of Bisti
SAN JUAN BASIN

From Williston in the north to Indian land in the south . . .

Fast Pace Gives Rockies Excellent Promises for '57

by John C. McCaslin
District Editor

EXPLORATION in the Rocky Mountain province nears the end of another year of significant and successful developments. Drilling records were shattered in some areas, fell behind in others. Each year sees new wildcat nuts to crack in this colorful oil country, and 1956 has had more than its share. This year's oil happenings in the region are setting the stage for big things in 1957.

From the top of the map in Williston land to the Indian country in the south's San Juan basin wildcat eye-openers keep well-spotters on the edge of their seats. As the Rockies' drillers get set for a new year of exploration and development, let's take a look at recent pacemaking events from Beaver Lodge to Bisti.

A new Williston approach . . . There is a definite search for new producing zones in the Williston basin. Since its birth the Mississippian rocks have been the most sought after. In recent months deep tests have been making their appearance throughout the North Dakota and Montana area, particularly at Beaver Lodge and on or near the Cedar Creek anticline.

Amerada Petroleum Corp. is prying deep down below the Mississippian reservoir at Beaver Lodge on the Nesson anticline of North Dakota. The 1 Iverson-Nelson unit is tapping oil and gas shows in the Winnipegosis of Devonian age and in the Silurian rocks.

A recent drill-stem test in the Winnipegosis was good for 3,000 M.c.f.d. of gas. Production from these zones was indicated back in the early days of Beaver Lodge drilling, but field development was aimed only at the Mississippian-Madison. The 1 Iverson-Nelson wildcat may well be the spark of a deep campaign for new reserves on the Nesson anticline.

The Cedar Creek anticline also is getting ready for new-pay development. Shell Oil Co. has begun operations at one well in Cabin Creek field, Montana, scheduled for Mission Canyon-Mississippian completion, and has announced location for a second try. The Mission Canyon indicated its oil worth at the Cabin Creek discovery well several years ago, but was never developed.

Amerada is testing at a Sheridan County prospect in northeastern Montana after finding good shows and recovery of Silurian oil. The 1 Tange, if successful, would move Montana production to its northeasternmost point.

100 ft. of effective Tensleep pay . . . The most important discovery in Wyoming this year is the opening of Ten-

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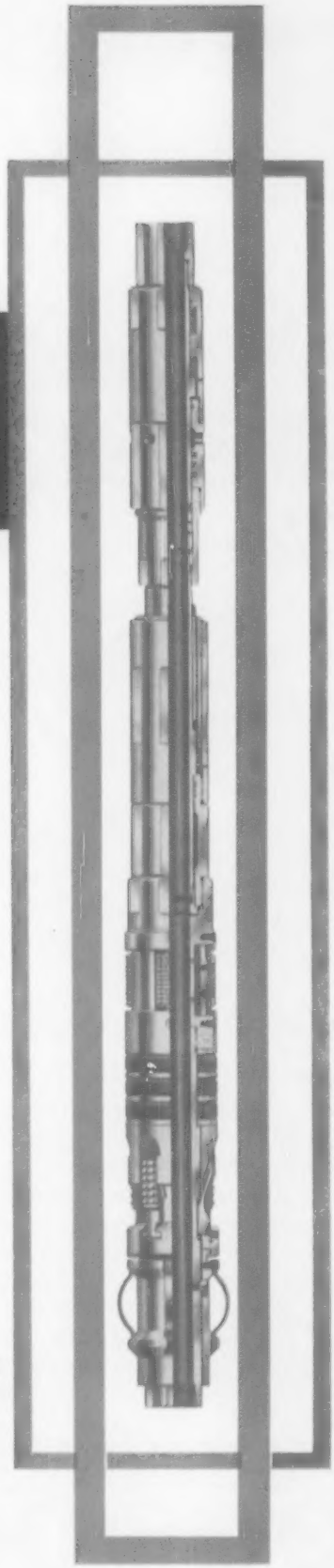

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sleep-Pennsylvanian production at East Salt Creek field in Natrona County in the southwestern part of the Powder River basin.

Sinclair Oil & Gas Co.'s Tensleep well, the 8 East Salt Creek A, was completed for 1,944 bbl. of oil per day, calculated. The effective pay zone was more than 100 ft. The discovery well has been confirmed, promising a deep development program for this shallow Wall Creek and Lakota - Cretaceous field.

Expansion at Grieve Unit . . . West of Casper in the southeastern part of the Wind River basin, the Grieve Unit area was extended 3 miles southeast with completion of a 225-bbl. per day discovery. The discovery well, Delta Drilling Co.'s 1 Government, which opens Southeast Grieve field, produces from the Muddy zone of Thermopolis shale. The Grieve unit has 18 producing wells.

A return to Uinta . . . For the first time this year there is some wildcat news from Utah's Uinta basin, a relatively quiet region for many months.

Havenstrite Oil Co. of Los Angeles hit in the Green River-Tertiary for 45 bbl. of oil per hour at a wildcat in the Ute Trail area, 17 miles west of Chapita Wells.

A Piceance flurry . . . Northwestern Colorado has been busy all year looking for new gas reserves. The wildcat drill has been moving steadily throughout the confines of the Piceance Creek basin, particularly in Rio Blanco, Mesa, and Moffat counties. Here are the latest scores:

- Gordon Hurd tapped commercial gas production in the Mesaverde-Upper Cretaceous at an old dry hole on the Divide Creek structure in Mesa County. The operator plugged back to upper zones, coming up with 4,260 M.c.f.d. gas. The confirmation well to this discovery must wait for spring because of the mountainous terrain and high altitude of Divide Creek.
- Frontier Refining Co. is testing gas shows at a wildcat on the White River dome in Rio Blanco County.
- Several other wildcats throughout the Piceance region have reported gas shows in recent weeks. This basin is one of the Rockies' least - developed areas, and one which is high in producing promise for the future.

And the Paradox show . . . The Four Corners region continues to be the Rockies' biggest drawing card. Recent Indian Lands sales promise surprise in the western area of the Paradox basin, and a 16-mile Gallup extension south of Bisti in the San Juan basin, have combined to make this southern Rocky Mountain sector a contender for 1957 exploratory honors.

Carter Oil Co. fired up the wildcat country west of Recapture Creek on the extreme end of the Aneth trend at its 2 Navajo-Gothic. Carter recovered high-pour-point, medium-gravity oil from the Mississippian at this wildcat, 9 miles southwest of Recapture Creek, Aneth's west anchor.

The oil show isn't definitely commercial in status, but recovery of Mississippian oil plus some found earlier at Bluff Unit, 10 miles northeast, strongly hints a push into the western Paradox basin is on its way—probably next year.

. . . Bisti. Wildcat drilling east and south of the main Bisti-Gallup producing area in the San Juan basin, a coming United States oil province, produced new shows. Forest Oil Corp. completed a wildcat discovery 16 miles south of Bisti in October for 120 bbl. of oil per day from the Gallup, forcing a new look at the vast area between the big field and Forest's well.

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CLUTCHES

and frontier-shattering exploration throughout the Rocky Mountains. Watch these areas closely:

- Northeastern Montana
- Western Powder River basin
- Western Paradox basin
- Piceance Creek basin
- The area east and south of Bisti.

ROCKY MOUNTAIN

Stanolind Oil & Gas Co. opened a new Morrow-Pennsylvanian gas pool in the Las Animas arch country of Kiowa County at 1 Bolton-Lamberson, C SE SE 7-20s-52w, 18½ miles northwest of Las Animas and 12½ miles northwest of Bents Fort field. The discovery flowed 554 M.c.f. of gas per day from perforations at 5,294-5,304 ft.

UTAH

Hermosa Well Finaled North of Aneth

The Texas Co. has a new producer for Aneth field in San Juan County. The 3 Navajo-E, C NW SE 9-40s-24e, flowed 303 bbl. of oil per day on 1-in. choke from perforations at 5,468-88 and 5,492-95 ft. This well is 1 mile northeast of nearest production. Some early tests at this well indicate that this may well be a northern limit well to Aneth production. Most production south of this well is from Paradox, but there is oil in the Upper Hermosa southwest of the 3 Navajo-E well.

NORTHWEST NEW MEXICO

San Juan Adds New Gallup Discovery

Anderson-Prichard Oil Corp. 1 Heris of Ko-Sa, E½ NW SW 23-25n-11w, San Juan County, flowed oil at the rate of 25-35 bbl. per hour on drill-stem test in what is believed to be Gallup-Cretaceous sand at 4,932-78 ft.

The new Gallup discovery is 3 miles east of Shell Oil Co.'s 4 Carson discovery, a 657-bbl. well on 48/64-in. choke in the Gallup.

Western Development Co. of Delaware announced that Gulf Oil Corp. has commenced drilling an important new deep test well in the San Juan basin under a farmout agreement from Western.

The initial well, located in the NW¼ NW 20-26n-11w, in San Juan County, New Mexico, will test the Gallup formation at estimated depth of 5,600 ft.

The site of this test well is approximately 6 miles north and east of the heart of Bisti field, where significant new oil reserves are being developed by a number of major companies. It is approximately 4 miles north of a producing oil well completed recently by Shell Oil Co. and is also directly south of Western Development Co.'s producing natural gas wells in West Kutz field of the San Juan basin.

COLORADO

Buckhorn Gas Discovery Finaled in Garmesa

Garfield County has a big gas discovery at Standard Uranium and Beehive Uranium Co. 1 Young, SE NW 6-8s-102w, 6½ miles northeast of Highline Canal, nearest production. The well was completed on calculated absolute open flow potential of 18,000 M.c.f. per day from perforations at 3,085-97 ft. in the top of the Buckhorn.

WESTERN CANADA

ALBERTA

Success Assured at Red Earth Confirmation

Union Oil Co. of California's initial follow-up to its 12-17 Red Earth Creek Granite Wash oil discovery well, was assured of success during the past week when drill-stem test conducted in the Wash gave up 4,570 ft. of very gassy lightweight oil. The new indicated success lies 1 mile east of the initial strike, which sparked the largest single land play in the history of western Canada's oil industry earlier this year, 75 miles east-northeast of Peace River town and about 220 miles north-northwest of Edmonton.

The firm's drilling project is being carried out on Petroleum and Natural Gas Reservation No. 2349 at the present time and as well as the two successes to date on that tract, the company has drilled one dry hole (5 miles north of the successes) in presently drilling another test (3 miles east of the initial discovery) and has staked location for an immediate start at an-

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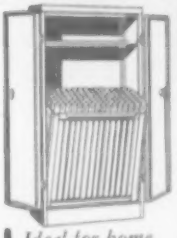

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other (1 mile north and ¼ mile east of the successful follow-up). This Reservation covers a total of 99,840 acres and is part of 1½ million acres held in the "Granite Wash" play area by the company. It is also understood from reliable sources that Union made application on a further 400,000 acres during the past week, but official word on that transaction is still forthcoming.

The recent success, Union 12-16 Red Earth, on LSD 12, 16-87-8w5, has reached total depth after running two drill-stem tests which covered a 78-ft. interval and crew is currently preparing to set production casing. The initial test in the zone taking in 57 ft. of that interval gave up only mud and very gassy oily mud while the bottom 22-ft. interval indicated commercial success by giving up the large oil recovery.

Oil Discovery Seen For Hughenden Area

The team of Provo Gas Producers, Ltd., and Western Naco Petroleums, Ltd., has indicated a crude oil strike in the Hughenden area of central-east Alberta during drill-stem test operations in the basal Cretaceous. The well, Provo-Naco 6-21 Hughenden, on LSD 6, 21-40-7w4, lies approximately 75 miles east-northeast of Stettler and 15 miles northwest of gas production in Provost field. In addition to indicating the discovery of oil the hole gave up interesting showings of gas in two separate zones, namely, the Viking and Glauconitic sands.

Drill-stem test in the basal Cretaceous which indicated the oil strike was taken of a 27-ft. interval below 2,700 ft. When pipe was pulled following the drill-stem test there was 1,585 ft. of clean oil and 5 ft. of salt water contained in it. Test in the Viking gave up gas at rate estimated at 800,000 cu. ft. daily; while gas flow in the Glauconitic was estimated at 750,000 cu. ft. daily.

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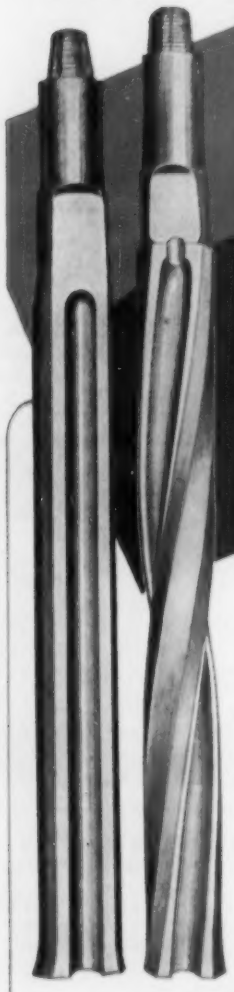

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SASKATCHEWAN

Production Tests Due At Dalesboro Wildcat

Tidewater Oil Co. is preparing to production test at an exploratory hole in the Dalesboro area of southeastern Saskatchewan which indicated oil production in the Mission Canyon sector of the Mississippian formation during recent drill-stem test operations conducted at the hole. This interesting wildcat, Tidewater 16-26 Dalesboro Crown, on LSD 16, 26-6-2w2, gave up some free oil from the horizon but indications are that the maximum pay zone at the well could only be 9 to 10 ft. thick. The wellsite lies 20 miles northeast of oil production in Frobisher field and 6 miles west-northwest of McCarty & Coleman's 8-23 South Manor which early last week indicated oil success in the same zone.

Initial drill-stem test in the Mission Canyon gave up heavily oil-cut mud and some water-cut oil while the next test bottomed at 3,946 ft., 24 ft. below the horizon's contact point showed the best recovery, when 270 ft. of gas-cut oil, 240 ft. of mud and gas-cut oil, and 90 ft. of water slightly oil-cut at the top was unloaded from the drill-stem. Third and last test indicated that the water interface had been penetrated as pipe recovery was over 600 ft. of salt water. Production casing has been set at a depth of 4,000 ft. and the well is undergoing a series of tests to fully evaluate its commercial worth.

PACIFIC COAST

CALIFORNIA

Union Completes First Stenderup Offset

Union Oil Co. of California completed 64-21 Union-Hancock-Cattani,

the first offset to its recent Stenderup discovery well in the Arvin area of Mountain View field, Kern County. This northeast offset was brought in flowing 730 bbl. daily of 28.2°-gravity crude, 4 per cent cut, 1 in. choke, from the Derby sand at 9,000 ft. Union originally took this test down to 10,331 ft. for a look at the Vedder before plugging back for the Derby completion.

Texaco Gets Big Well In New McInnes Pool

The Texas Co. joined Standard Oil Co. of California with a big producer in the new McInnes pool activity 1 mile west of Oxnard field in Ventura County. Texaco's extenson test to Standard's discovery was brought in flowing 790 bbl. daily of 29.4°-gravity crude from selectively perforated intervals between 6,402 ft. and 6,495 ft. The well is producing through a 14 64-in. choke. It is located 920 ft. west of Standard 1 Diedrich Community, the discovery well.

Meanwhile, Standard was getting ready to bring in its third well in the pool. Standard 2 Donlon Community is located more than 1,400 ft. southwest of the discovery.

Fault Block Discovery At Santa Fe Springs

Edward Nepple was nearing completion of 1 SP-Pedro-Nepple as a new fault block discovery in the equivalent of the Santa Fe pool sand on the extreme west flank of the old Los Angeles Santa Fe Springs field. Nepple is reported to have 320 ft. of zone open in this 10,152 ft. wildcat. Santa Fe Springs field operators are watching this well closely and, if it comes in good and production holds up, a new drilling boom is in prospect for the field.

Successful Wildcats

CALIFORNIA

Kern County: Sunset International Petroleum Corp. 1 Continental-Gonyer USL, NW SE 32-32s-23e, 53 BOPD, 15° gravity, perfs. 1,685-1,798 ft., TD 1,798 ft. (New field discovery on west flank of Midway-Sunset field.)

SASKATCHEWAN

McCarty & Coleman 8-23 South Manor, LSD 8, 23-6-1w2. TD 3,900 ft. Mission Canyon oil.

ALBERTA

Okalta Canpet 7-16 Richdale, LSD 7, 16-30-21w4. TD 3,793 ft. Viking gas well.

Imperial Decalta Partridge 5-13 Obed, LSD 5, 13-54-23w5. TD 11,456 ft. Rundle gas well.

NEBRASKA

Cheyenne County: Chandler-Musgrove 1 Toof, C SE NE 26-15n-52w. IPP 129 BOPD, "J" sand discovery, new field. TD 5,370 ft. Skull Creek.

COLORADO

Adams County: Jack Rouse et al 1 Monaghan, C NW NW 8-3s-65w. IPF 100 BOPD, 16/64-in. choke, "J" sand discovery, new field. TD 8,453 ft. Dakota.

Kiowa County: Stanolind Oil & Gas Co. 1 Bolton-Lamberson, C SE SE 7-20s-52w. IP 554 M.c.f. of gas per day, open flow. Morrow discovery, new field. TD 5,683 ft. Mississippian.

Weld County: Utah-Southern Oil Co. 1 Doty-Federal, C NW NW 27-8n-60w. IPF 125 BOPD, "D" sand discovery, new field. TD 7,053 ft. "J" sand.

WEST TEXAS

Martin County: B. B. M. Drilling Co. 1 Cowden, 31-40-T1N-T&P, 8 mi. NW Midland. IP 234 BOPD, 16/64-in., TP 560 psi., GOR 1838, 40°, Strawn perforations 10,455-86 ft. TD 10,816 ft.

EAST TEXAS

Rusk County: Sam Barnett 1 Kangerga, R. A. Allen Sur., 6 mi. S Price. IP 3,000 M.c.f. gas, open flow, Woodbine 3,776-78 ft. TD 3,778 ft.

WEST CENTRAL TEXAS

Stephens County: Magnolia Petroleum Co. 1 Nail, Sec. 665, TE&L Sur., 1½ mi.

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SOUTHEAST NEW MEXICO

Lea County: Phillips Petroleum Co. 6 Leamex, 23-17s-33e. IP 264 BOPD, ⅛-in., TP 150 psi., GOR 1061, 37°, Pennsylvanian 11,328-64 ft. TD 16,842 ft., PB 11,368 ft. Elev. 4,158 ft., top pre-Cambrian 16,837 ft.

NORTH TEXAS

Archer County: Bridwell Oil Co. 2 Schenk, 20-3-Clark & Plumb, 2 mi. NE Scotland. IP 107 BOPD, 8/64-in., TP 460 psi. GOR 750, 40°, GOR 750, pay 5,982-87 ft. TD 5,993 ft.

Knox County: Sikes-Burkckhalter et al 1 Coffman, Blk. 86, H&TC, 1½ mi. SW Goree. IPP 50 BOPD, 39°, GOR zero, pay 1,821 ft. TD 2,003 ft.

Wichita County: W. A. Lofton 2-DD Waggoner estate, Blk. 27, Tarrant CSL, 1 mi. E Iowa Park. IPP 124 BOPD, 40°, GOR 300, pay 4,127-52 ft. TD 4,202 ft.

Young County: Bolin Oil Co. 1 Jackson-Loving, Sec. 2788, TE&L Sur., A-2055, 5 mi. NE Loving. IPP 38.8 BOPD, 41°, GOR 360, pay 2,878 ft. TD 3,468 ft.

Jefson Oil Co. 1-A Baker, TE&L Sur. 2787, A-2058, 3 mi. NW Jerymn. IPP 82 BOPD, 41°, GOR 75, pay 2,886 ft. TD 2,894 ft.

TEXAS GULF COAST

Harris County: The Texas Co. 1 R. E. Smith, Blass Herrera Sur., A-320. IP 5,100 M.c.f. daily, open-flow potential, GOR 27.8 M.c.f. per bbl., 62.9°, perforations 8,272-86 ft. (Vicksburg). TD 8,350 ft. (Discovery well on north flank of Mykawa dome—1½ miles from other production.)

Matagorda County: Michel T. Halbouty 1 McDonald, W. Kierans Sur., A-346. IP 9,200 M.c.f. daily, open-flow potential, GOR 42.5 M.c.f. per bbl., 60.2°, perforations 9,222-32 ft. (lower Frio). TD 10,791 ft. (New field discovery—Pheasant.)

J. S. Michael 7 Hamill & Hamill et al, Williams Baxter Sur., A-4. IP 17,800 M.c.f. daily, open-flow potential, GOR 200 M.c.f. per bbl., 65°, perforations 6,111-16 ft. TD 7,260 ft. (New pay in South Sargent field.)

LOUISIANA GULF COAST

Jefferson Parish: California Co. 12 Lester Pailot et al, 2-16s-23e. IP 125 BOPD, 17/64-in., 36.3°, perforations 9,280-83 ft. TD 10,800 ft. (Extension and new pay in Bayou Perot field.)

Lafayette Parish: Columbian Carbon Co. 1 Mayer, 13-9s-3e. IP 197 BOPD, ⅛-in., 41°, perforations 12,987-88 ft. and 13,004-12 ft. TD 16,017 ft. (New field.)

Plaquemines Parish: California Co. 2 Morris Steinberg, 41-15s-12e. IP 48 BOPD and 5,307 M.c.f. daily, 9/32-in., 45.2°, perforations 10,178-97 ft. TD 10,837 ft. (Discovery well in Willis Point area.)

St. Landry Parish: Olin Oil & Gas Corp. et al 1 Higginbotham Unit, 28-6s-3e. IP 2,000 M.c.f. daily and 50 BOPD, 3/16-in. 49°, perforations 9,380-84 ft. TD 11,455 ft. (New field, or 2-mile north extension of Lewisburg field.)

OKLAHOMA

Caddo County: Sinclair Oil & Gas Co. 1 Susie, C NW SE 1-6n-13w. IPF 533 BO 18 hours, first Bromide sand 8,711-49 and 8,763-92 ft.; second Bromide sand 8,841-53 ft. and 8,869-8,907 ft. TD 9,621 ft. PBTD 9,612 ft. Discovery opened Northeast Alden field. Completed September 11, 1956.

Comanche County: Raymond Rhodes 1 Doyle, C E½ SW SE 6-4n-11w. IPP 28 BOPD, sand 455-59 ft. TD 459 ft. Discovery opened Southwest Apache field. Completed June 1956.

Osage County: J. G. Catlett 2 Osage, SW SW NW 8-25n-8e. IPP 70 BOPD, Mississippi chat 2,382-94 ft. TD 2,730 ft. Discovery opened North Atlantic field. Completed July 1956.

Marshall County: The Texas Co. 1 Vanderpool, SW SW SE 2-6s-6e. IPP 110 BOPD, Hunton lime 4,804-40 ft. and 4,870-90 ft. TD 8,235 ft. PBTD 4,902 ft. Discovery opened North Aylesworth field. Completed August 1956.

Osage County: W. Reese Dillard and Gross Drilling Co. 1 Osage, NE NE SW 11-26n-7e. IPP 25 BOPD, Burbank sand 2,491-2,503 ft. TD 2,874 ft. Discovery opened Southwest Blackland field. Completed June 1956.

Kiowa County: W. T. Waggoner, Jr., 1 V. Suitor, SW NE SW 19-7n-15w. IPP 5 BOPD, sand 420-23 ft. TD 423 ft. Discovery opened East Gotebo field. Completed July 1956.

Osage County: Phillips Petroleum Co. and K. A. Ellison 1 Osage, NW NW SE 16-24n-6e. IPP 21 BOPD, Mississippi chat, 2,886-2,900 ft. TD 3,374 ft. PBTD 3,338 ft. Discovery opened West Gray-Horse field. Completed July 1956.

Texas County: Panhandle Eastern Pipe Line Co. O-1 Fletcher, C SW NE 24-3n-17eCM. IPF 41 BOPD, Morrow sand 6,254-98 ft. TD 6,720 ft. Discovery opened North Hardesty field. Completed April 1956.

Tillman County: Phillips and Shirley Thompson 1 H. B. Aiken, NE NE NW 8-3s-17w. IPP 36 BOPD, Canyon sand 3,064-74 ft. TD 4,710 ft. Discovery opened East Henderson field. Completed August 1956.

Seminole County: W. L. Kistler, Jr., and I. V. Horner 1 Orwig, SE SE NW 25-10n-6e. IPF 720 BOPD, Earlsboro sand 3,400-18 ft. Discovery opened East Keokuk field. Completed August 1956.

Osage County: Sooner Oil Co. 1 Osage, SW SW NW 8-28n-9e. IPF 267 BOPD, Wayside sand 1,590-1,602 ft. TD 2,337 ft. Discovery opened West Landon field. Completed June 1956.

Beaver County: White Eagle Oil Co. and Shell Oil Co. 1 Baldwin, C NE NE 30-1n-26eCM. IPF 235 BOPD, Missouri sand 5,984-6,016 ft. TD 8,632 ft. PBTD 6,086 ft. Discovery opened Southwest Logan field. Completed August 1956.

Garvin County: Pure Oil Co. 1 Rakestraw, NW NE SE 2-4n-2w. IPF 293 BOPD, Viola lime 6,020-50 ft. TD 7,450 ft. PBTD 6,092 ft. Discovery opened Northeast Maysville field Completed August 1956.

Humphrey Oil Corp. 1 O. L. Ledgerwood, SW NW NW 17-4n-2w. IPP 10 BOPD, Bromide sand 7,384-86 ft. TD 7,484 ft. PBTD 7,395 ft. Discovery opened West Maysville field. Completed February 1956.

Osage County: Kewanee Oil Co. 1 Osage, SW SW NW 16-25n-7e. IPP 30 BOPD, Mississippi chat 2,694-96 ft. TD 2,741 ft. PBTD 2,726 ft. Discovery opened Strohm field. Completed August 1956.

Kay County: Dave Morgan Oil Co. 1 Burr, NW NW NW 20-25n-1e. IPF 65 BOPD, Red Fork sand 4,060-82 ft. TD 4,354 ft. PBTD 4,230 ft. Discovery opened Northeast Tonkawa field. Completed July 1956.

Okmulgee County: Home-Stake Oil & Gas Co. 1 Stanley, SW SE NE 9-13n-11e. IPF 50 BOPD, Dutcher sand 2,523-33 ft. TD 3,677 ft. Discovery opened West Youngstown field. Completed July 1956.

Beaver County: Stanolind 1 Barnett, NW NW SE 30-5n-24eCM. IP 4,819 M.c.f. of gas per day, Morrow sand 6,441-48 ft. TD 6,604 ft. Discovery opened Southeast Forgan field. Completed August 1956.

Cimarron County: Phillips 1 Bruere, C SW NE 31-1n-9eCM. IPP 76 BOPD, 3,900 M.c.f. of gas per day, Winfield sand 2,511-39 ft. and Massive lime 3,226-3,382 ft. TD 5,640 ft. PBTD 3,669 ft. Discovery opened South Griggs field. Completed August 1956.

Beaver County: Cabot Carbon Co. 2 Barby "B," C NE SW 27-4n-25eCM. IP 5,500 M.c.f. of gas per day from uper zone; 8,500 M.c.f. per day from lower zone. Morrow sand 6,894-6,912 ft. and 6,936-64 ft.; Mississippi lime 7,021-31 and 7,054-64 ft. TD 7,183 ft. PBTD 7,128 ft. Discovery opened Northwest Ridgeway field. Completed January 1956.

Cabot Carbon 1 Barby "D," C SE NW 25-4n-26eCM. IP 4,162 M.c.f. of gas per day, Lovell sand 4,871-94 ft. and Tonkawa sand 5,275-82 ft. TD 7,200 ft. Discovery opened Sunny Side field. Completed July 1956.

KANSAS

Barton County: West Klug pool was opened at Petroleum, Inc., 1 Demel "D," NE NW NW 33-17s-13w. Completing in Lansing. TD 3,380 ft.

Cowley County: Northwest Falls City pool was opened at McNeish & Gralapp 1 Evans, NW NE SE 11-35s-6e. IPP 5 BOPD, Mississippi. TD 3,071 ft.

Dickinson County: Northeast Bonaccord pool was opened at Willis Waterman 1 Emig "A," SW SW NE 29-14s-1e. IPP 35 BOPD, Burgess sand. TD 2,505 ft.

Ford County: Konda pool was opened at Pure Oil Co.-Ohio Oil Co. 1 Anna Konda, C NW SW 11-27s-22w. Completing in Mississippi. TD 5,097 ft.

Harvey County: East Burrton pool was opened at Stelbar Oil Co. 1 Becker, SE SE NW 28-23s-3w. Completing in Mississippi. TD 3,322 ft.

Kiowa County: Greensburg pool opened at Anschutz Drilling Co. 1 Stewart, NE NE NE 35-27s-18w. IP 2,738 M.c.f. of gas per day, Kinderhook-Miss. TD 5,120 ft.

Northeast Greensburg pool was opened at Aurora Gasoline Co. 1 Campbell, SE SE SW 17-27s-17w. IP 4,150 M.c.f. of gas per day, Mississippian. TD 5,071 ft.

Meade County: Fincham pool was opened at Monsanto and Rine Drilling Co. 1 Marion, C N½ SW NE 14-35s-27w. Completing in Mississippi. TD 6,432 ft.

Horace pool was opened at Monsanto 1 Horace, C SE SE 9-34s-29w. Completed in Morrow. TD 6,073 ft.

Sanders pool was opened at The Texas Co. 1 Sanders, SE NW NE 13-32s-29w. IP 9,153 M.c.f. of gas per day, Mississippi. TD 5,944 ft.

Pawnee County: Newsom pool was opened at Honaker-Davis 1 Newsom, NW NE NE 25-20s-20w. Completing in Mississippi. TD 4,428 ft.

Pratt County: Northeast Carver-Robbins pool was opened at Osage Oil & Gas Co. 1 Cochran Est., NW NW SE 10-27s-15w. IPF 131 BOPD, conglomerate. TD 4,481 ft.

Rawlins County: Brumm pool was opened at Miami Operating Co. 1 Brumm "A," NE SE SW 7-2s-36w. IP 75 BOPD, Lansing. TD 5,200 ft.

Seward County: West Plains pool was opened at Southwestern Exploration Co. 1 Collins, SW NE NE 16-32s-31w. Completing in Morrow sand. TD 5,750 ft.

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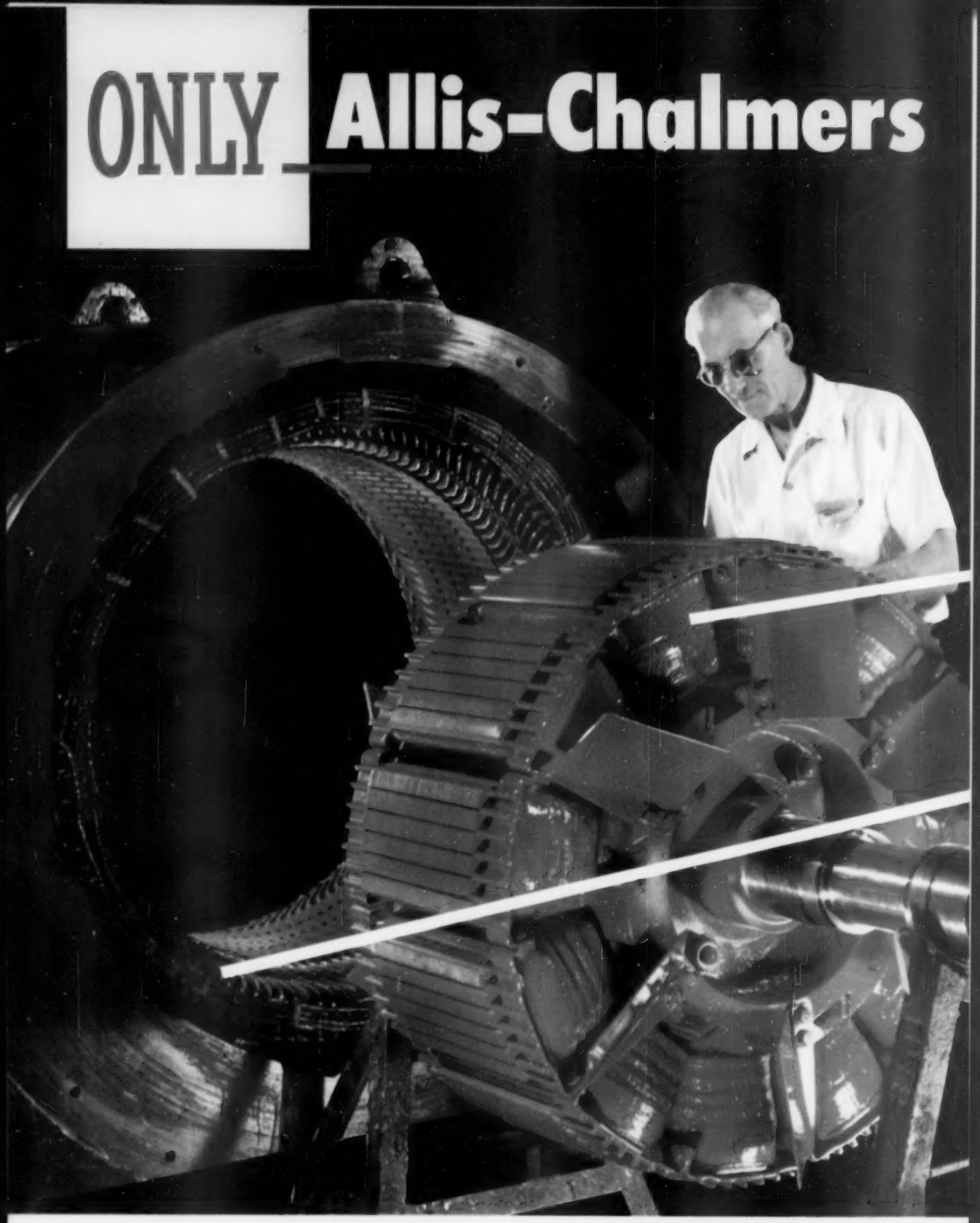

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1

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For the tricky drilling business . . .

Parks Says Good Men Needed

GEORGE B. PARKS, new vice president for production and drilling operations for Kerr-McGee Oil Industries, Inc., says the contract-drilling business has become a low-profit, high-volume affair.

"This means that the contractor has to watch his costs at every turn to stay in business," Parks explains. "In fact I consider the business is at the crossroads now. The way problems facing us are solved these days may well determine how good an industry we'll have in the future."

Parks is confident the problems will be solved. He still feels the drilling industry is a safe one in which to invest a career.

"There's a feeling that the drilling game isn't offering the incentives at present to attract enough of the desirable kind of personnel we need. This includes bright men for our drilling crews, as well as young trained engineers.

"We need both kinds of men to help us operate our business. They can help solve our other problems: Making hole faster and better with better tools, keeping down our other costs, and getting a fair price for our work."

About offshore . . . Parks advises that offshore drilling work at the moment is more attractive than onshore jobs. But he warns this also can be a delusion.

Parks is ably qualified to talk on both types of operations. He has had experience onshore and his rise in Kerr-McGee has coincided with his firm's heavy investment in offshore tools.

"It's really too early to tell just how good contract-drilling is going to be offshore—too many unknown factors," he says. "It's true competition is not so great and present contract prices appear fair. The risks, however, are tremendous because of the investment required.

"The big unknown factors are obsolescence and depreciation. We know both are big. It's hard to figure obsolescence, though, and it's something that can make a piece of equipment noncompetitive quickly."

One big risk, according to Parks, is the danger of a contractor tying himself into a long-term contract without giving adequate consideration to increasing labor, material, and replacement costs. It's easy for a contract to go sour and instead of making money it will insure a loss.

GEORGE B. PARKS
. . . contract-drilling at the crossroads

Same old job . . . Parks admits he's doing the same work as a vice president he has done for the last few years with Kermac as production-drilling manager.

"Only thing new is the title," he joked.

Parks joined Kermac in 1947 as a production engineer at Morgan City and before being transferred in 1951 to Oklahoma City he had moved up to production superintendent.

But those years at Morgan City were important—they set a pattern. He became well grounded in Kermac's drilling operations along the Gulf Coast and had a hand in the firm's work on the first offshore well out of sight of land. He saw the company's first ventures pay off and since has played a major role in making the Kermac name a dominate one in offshore drilling.

Parks says the first equipment used—a fixed platform and tender—is still working for Kermac. Their fields of use are limited but they still have a place. He thinks the new giant mobile drilling barge Kermac is putting to work will be more economical and have a wider range of work.

When Parks came to Kermac's Oklahoma City headquarters, he had the job of general production superintendent. In 1954 he was named manager of the production department. The next year drilling operations were added to his supervision and this year he stepped up to a vice presidency.

Personals

Oily background . . . Parks brought plenty of oil field and construction experience to his first Kermac job.

He was graduated from Texas A. & M. College in 1940 and immediately went to work with Stanolind Oil & Gas Co. on the Gulf Coast as a roustabout, roughneck, and later engineer trainee.

Parks took time out from the oil industry for 4 years of military service doing construction and engineering work in Texas and Oklahoma. He was released in 1945 and went to work for Sunray Oil Corp. as an engineer at Odessa. He left there to join Kermac.

Robert W. Bax, district engineer for The Texas Co. in Williston, N. D., has joined Lewis Brothers Drilling, Inc., in Denver as petroleum engineer.

R. J. Haas and **Charles Sanders** of Phillips Petroleum Co.'s Denver office have been transferred to the company's new Casper, Wyo., district office as district exploration geologist and district development geologist. Haas was previously basin geologist in Denver and Sanders was division staff geologist.

Neal Clayton, formerly president of Liberty Exploration Co., has sold his interest in that company and joined Sohio Petroleum Co. as staff geophysicist in Oklahoma City.

A. V. DANNER

Arthur V. Danner, vice president and director of Mobil Overseas Oil Co., Inc., has been elected president. Danner succeeds **Paul V. Keyser, Jr.,** a vice president and director of Socony Mobil Oil Co., Inc. Keyser will continue as a director of Mobil Overseas. A graduate of Georgetown University, Danner joined the old Socony-Vacuum Oil Co. in 1937.

Robert L. Kidd, president of Cities Service Oil Co., and **Harry D. Hancock,** president of Cities Service Gas Co., have been elected directors of Cities Service Co. Kidd has been president of Cities Service Oil Co. since July 1956, and Hancock was elected president of Cities Service Gas last month. Kidd joined Cities Service in 1925. Hancock began his career as a junior engineer with Denver Gas & Electric Co. in 1912.

Personals

Rolland Wonderly has been named geologist in charge of Utah Southern Oil Co.'s new Denver office.

R. G. ANDERSON

Reader G. Anderson has been appointed assistant general superintendent of operations and utilities at the Texas City refinery of American Oil Co. Anderson has been on temporary assignment as assistant to the general manager of manufacturing in New York. He replaces **William A. Sullender,** who has been named assistant manager of operations in the marketing department.

Odell Campbell, manager of laboratories for E. I. du Pont de Nemours & Co. in Tulsa, has joined Kerr-McGee Oil Industries, Inc., in Oklahoma City as technical assistant to the vice president in charge of refining.

Dr. Ellis K. Fields has been named a group leader in the research department of Standard Oil Co. (Ind.) at Whiting, Ind. Fields will conduct exploratory research in the fields of high octane hydrocarbons and petrochemicals. He has been with Indiana Standard since 1950.

Don S. Hare, Monterey Oil Co., has been elected chairman of the Los Angeles Basin chapter, American Petroleum Institute. Other officers are **Harold Nissen,** vice chairman and program chairman, Signal Oil & Gas Co.; **Bill Prigge,** secretary-treasurer, Kobe, Inc.; **Carl Mercer,** assistant secretary-treasurer, Servco Oil Co.

Burton P. Smith has been named president of Pioneer Gathering System, Inc., a subsidiary of Pioneer Natural Gas Co., Amarillo, Tex., of which he is a director, vice president, and treasurer. He succeeds **C. H. Hinton,** who will be retained to aid the company in acquiring new gas supplies. **C. W. Pankratz,** a mechanical engineering graduate of the University of Oklahoma, is the new vice president and chief engineer of Pioneer Gathering System.

A. F. Cox, president of Amarillo Oil Co., has been elected president of Pioneer Production Corp., which has been organized by Pioneer Natural Gas. **T. S. Whitis,** vice president of the parent company, has been named vice president of the producing subsidiary.

Danny E. Shupp, engineer with Carter Oil Co., has been transferred to St. Elmo, Ill., from Oklahoma City.

R. W. Forster, geologist for Shell Oil Co., has been transferred to Oklahoma City from Houston.

J. C. Trimble has been transferred by Shell Oil Co. to Ardmore, Okla., as exploitation engineer. Trimble was formerly in the North Texas production department, Wichita Falls, Tex.

George H. Link, division engineer with Carter Oil Co. in Billings, Mont., has been promoted to chief petroleum engineer with Standard-Vacuum Petroleum Maatschappij, N.V., in Palembang, Sumatra.

Dolphe E. Simic has been appointed exploration manager of Frankfort Oil Co., and **Thomas P. Brooks** has been

T. P. BROOKS

D. E. SIMIC

named production manager. Simic was formerly with Halbert, Jennings & Simic, oil producers, in Denver and before that was vice president in charge of exploration for Bay Petroleum Co. Brooks was previously general production superintendent for Southern Production Co. in Fort Worth and before that was with Lion Oil Co.

C. L. Cox has been named assistant district production superintendent at Nowata, Okla., by Sinclair Oil & Gas Co. Cox was formerly at Madill, Okla. **Robert W. Stallings,** district foreman at Thrall, Kans., for Sinclair, has been transferred to Madill to replace Cox. **Clyde C. Osborn,** assistant district foreman at Nowata, has been transferred to Thrall.

Dr. George B. Miller has joined the technical staff of Ohio Oil Co.'s research center in Denver as research physicist. A graduate of Wayne University, Miller received his Ph.D. from Purdue University this year. **Dr. Charles W. Gullikson** has joined the research center as research technologist in the physics section. He recently received his Ph.D. degree from the University of Oklahoma. **Dr. John L. Gray,** Ph.D. from the University of Wisconsin, has joined the geology section as research technologist.

Harry E. Zenner, Jr., gas engineer for Magnolia Petroleum Co., has been transferred to Lake Charles, La., from Falfurrias, Tex.

W. A. Schaeffer, Jr., chief engineer for Southern Production Co., Inc., in Fort Worth, has joined Sinclair Oil & Gas Co. in Tulsa as assistant manager of the economics department.

Louis S. Hochman, geologist for Tidewater Oil Co. in Casper, Wyo., has joined Caulkins Oil Co. in Casper in the same capacity.

L. L. Patterson, plant engineer at Cities Service Oil Co.'s Ambrose gasoline plant near Blackwell, Okla., has been named production superintendent of the plant. Patterson has been with Cities Service since 1950.

W. R. Strickland of Skelly Oil Co., Bismarck, N. D., has been elected a vice president of the North Dakota Oil and Gas Association succeeding **C. Rex Brown** of Sun Oil Co. Brown has been transferred to Billings, Mont., from Bismarck.

E. F. Koenig, technical services associate with The Texas Co., has been promoted to technical representative of the technical services division, research and technical department. His headquarters will be in Beacon, N. Y.

Harold G. Teverbaugh, general superintendent of Texas Natural Gasoline Corp., has been elected vice president of the company. Teverbaugh joined Texas Natural in 1953. A graduate of Oklahoma A.&M. College, he was formerly with Stanolind Oil & Gas Co. and the old Sunray Oil Corp.

G. D. (Dan) Almen, Jr., assistant to the president and manager of offshore operations for Sinclair Oil & Gas Co., has been elected a vice president. A graduate of the University of Oklahoma, Almen joined Sinclair in 1936. He has been manager of offshore operations since 1954.

Rawleigh Warner, Jr., has been named manager of the economics department and a member of the coordination committee of Socony Mobil Oil Co., Inc. Warner succeeds **Albert J. McIntosh,** who has joined the company's public relations department as consultant. Warner joined Socony-Vacuum Overseas Supply Co., Inc., in 1953.

M. B. Lipscomb, Sr., chief engineer for Texas Eastern Transmission Co. in Richmond, Tex., has been transferred to Opelousas, La., in the same capacity.

Phil Cook, exploitation engineer for Union Oil Co. of California, has been transferred to Orcutt, Calif., from Santa Fe Springs, Calif. Cook joined Union's exploration department in 1951. He is a graduate of Ohio University and California Institute of Technology.

Gene Shaw, geologist with American Stratigraphic Co. in Denver, and **Ray Blakely,** geologist with Stanolind Oil & Gas Co. in Albuquerque, have joined Forest Oil Corp. in Denver.

B. L. Haynes, Jr., drilling engineer with The California Co., has been transferred to Fort Collins, Colo., from Vernal, Utah.

Frank Andrews has been named vice president and general manager of Sid Richardson Gasoline Co. and Sid Richardson Carbon Co.

W. T. Nightingale, president of Mountain Fuel Supply Co., Salt Lake City, has been elected a director of the National Association of Manufacturers. Nightingale has been Mountain Fuel president since 1951.

J. E. Bailey, chief petroleum engineer for Tidewater Oil Co.'s southern division, has been named senior technical adviser to National Iranian Oil Co. and transferred to Teheran, Iran, under a 2-year loan agreement between Tidewater and National Iranian Oil. Tidewater is a member of the consortium holding an interest in the Iranian company. Bailey has been with Tidewater since 1937.

Frank Siegel has been appointed division exploration manager in Sun Oil Co.'s Canadian production division. **Hilton Westmore** has been named division chief geologist and **A. Douglas Brown** will be division petroleum engineer. Siegel, formerly assistant to the division chief geologist, has been with Sun since 1944. Westmore has been with Sun since 1950. He was assistant chief geologist before his recent appointment. Westmore succeeds **Lloyd E. Miller,** who has been promoted to assistant division manager. Brown has been in Canadian division operating department since 1953.

John Nichols, engineer for Carter Oil Co. in Carmi, Ill., has joined **H. H. Kaveler,** petroleum engineering and management consultant in Tulsa, as petroleum engineer.

William Evelyn, petroleum engineering consultant in Casper, Wyo., has been retained as an advisor by the Wyoming Oil and Gas Commission.

Don I. Gardner, geological engineer with Phillips Petroleum Co., has been transferred to Anchorage, Alaska, from Wichita.

Dr. Momhamed Mortada, senior engineer in Dallas for Magnolia Petroleum Co., has been awarded the Alfred Nobel Prize, an award sponsored by five engineering organizations in recognition of an outstanding engineering paper written by a young engineer. Mortada's paper, "A Practical Method for Treating Oil Field Interference in Water-Drive Reservoirs," has also been voted the Rossiter W. Raymond award of the American Institute of Mining, Metallurgical and Petroleum Engineers.

William K. Whiteford, president of Gulf Oil Corp., has been elected a director of General Motors. Whiteford has been president of Gulf since 1953.

F. G. Watson, assistant to Shell Chemical Corp.'s manufacturing vice president, has been appointed assistant manager of manufacturing development for the company. **C. H. Plomteaux,** assistant superintendent of Shell Chemical's Norco, La., plant, will succeed Watson as assistant to the manufacturing vice president. Watson has been with Shell since 1942, Plomteaux since 1940.

Personals

F. N. Bosco, Midland, Tex., consultant, has joined W. H. Gaddis, oil producer, in Denver as geologist.

Robert M. Kahl has been named vice president of Cuban-Kewanee Oil Co. and transferred to the Philadelphia office of Kewanee Oil Co. from Tulsa.

Edward W. Porter, staff engineer for Phillips Petroleum Co. in Bartlesville, Okla., has been promoted to assistant superintendent of the West Texas district and transferred to Odessa, Tex.

G. C. Carr, manager of distribution and marketing operations for Shell Petroleum Co. in London, has retired. Carr joined Eagle Oil & Shipping Co., Ltd., a Shell group company, in 1934. He was named chief engineer in 1940 and transferred to Shell Petroleum in 1952. Before joining Shell, he was refinery and chief field engineer with Attock Oil Co. in the Punjab, and later with Emsco Derrick Equipment Co. in Los Angeles, and with Continental Emsco Co., Inc., in London.

E. Allan Morrow, vice president of Leonard Refineries, Inc., has been elected president of the Michigan Oil and Gas Association. Morrow has been vice president of the association for the past 2 years. He was president of Roosevelt Oil & Refining Co. before its merger with Leonard last year.

DEATHS

Edward Scott, Jr., 30, petroleum engineer for Gulf Oil Corp. in Borger, Tex., died November 28 in Amarillo, Tex., after brain surgery. He had been ill for 3 weeks. A 1950 graduate of the University of Tulsa, Scott was with Skelly Oil Co. before joining Gulf.

Robert O. Slater, 73, retired owner of Bob Slater Drilling Co., died December 2 in Tulsa. A leader in early Oklahoma conservation plans, Slater founded his drilling firm in 1914 in Tulsa. He retired in 1942.

W. G. Selby, 72, vice president of the Selby Oil & Gas Co., Tulsa, before its consolidation with The Texas Co. in 1942, died December 4 in Sarasota, Fla.

G. C. McAuliffe, 55, Columbian Fuel Corp., Tyler, Tex., died November 29 in San Diego, Calif. McAuliffe was chief geologist for Columbian Carbon Co. in Monroe, La., before his transfer to Tyler in 1954.

W. R. Wardner, Sr., 78, pioneer California oil man who helped organize some of the state's earliest conservation activities, died November 28 in Los Angeles. He was the father of W. R. Wardner, Jr., manager of the California Oil Producers conservation committee.

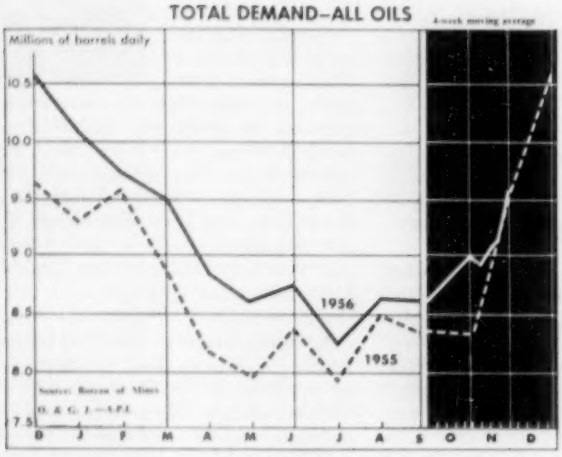
Henry Kirk Bowers, 51, manager of Socony Mobil Oil Co.'s White Eagle division, Kansas City, died December 2 in Kansas City.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,107,850	DOWN	66,450	UP	34,488
Crude stocks	279,842,000	DOWN	379,000	UP	22,103,000
Completions	1,013	DOWN	25	DOWN	48
Refinery runs	8,114,000	UP	3,000	UP	313,000
Gasoline stocks	175,401,000	UP	857,000	UP	17,866,000
Kerosine stocks	34,595,000	DOWN	1,710,000	UP	1,374,000
Distillate stocks	153,498,000	DOWN	5,373,000	UP	13,395,000
Residual stocks	44,389,000	DOWN	1,356,000	UP	233,000
Four-product stocks	407,883,000	DOWN	7,582,000	UP	32,868,000
Total imports	1,394,000	DOWN	16,000	UP	144,800

TOTAL DEMAND—ALL OILS



September Demand Revised Downward; October-November Total May Be Raised

DEMAND totals, shown on the above chart, have been revised for September and October, based on the latest data from the Monthly Petroleum Statement from the Bureau of Mines.

Total September demand for the four major products, calculated from weekly figures, amounted to almost 300,000 bbl. daily more than the actual average reported by the Bureau of Mines.

Most of the difference was in inventory changes during the month with variations from actual in both opening and closing stocks.

The bureau reported total stocks of gasoline, kerosine, distillate, and residual amounting to 389,287,000 bbl. at the first of the month and 409,315,000 bbl. at the end of the month. This shows that 20,028,000 bbl. of major product stocks went to storage during September or at the rate of 668,000 bbl. daily.

End-of-August stocks, calculated from weekly reports, amounted to 393,970,000 bbl. daily and had risen only to 407,240,000 bbl. at the end of September. The gain in stocks from these data shows up as only 13,270,000 bbl. for the month or 442,000 bbl. daily.

Calculated demands are based on the assumption that any products, made during the month, that do not go into increased storage are sold to consumers and represent demand.

Since the weekly figures show 226,000 bbl. daily smaller net additions to stocks during the month, calculated demand based on these figures would be too high by the same amount.

Total demand was in error by about 300,000 bbl. daily with 226,000 bbl. daily due to differences in reported stocks. Most of the remaining difference was in the reported total for imports of residual fuel. The bureau carried actual resid imports at 329,000 bbl. daily compared with 397,000 bbl. daily calculated from the weekly reports. The weekly figures do not include Rate Provision 16 receipts, mostly heavy fuel, which averaged 41,000 bbl. daily during July, August, and September.

Since part of the high weekly average for September was due to underreporting of stocks at the end of the month, actual demand figures for October and November may have been higher than the totals calculated from weekly reports. The above chart shows very little change over last year for the 4-week period ended November 30.

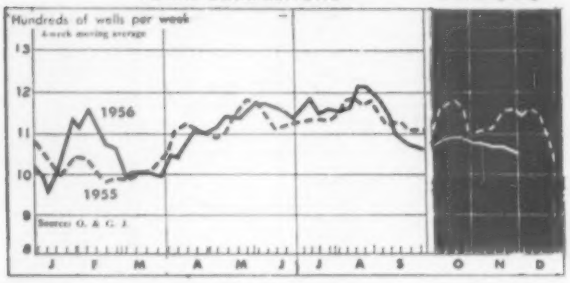
Gulf Coast markets reflect shortages . . . Offshore demand for crude and heavy fuel is draining storage tanks on the Gulf Coast at a rate that is limited by only tanker and product availability.

Some crude prices have moved up, but there has been no general price increase. Higher postings for high-sulfur, low-gravity crudes in the Rocky Mountain area reflect increased sales of residual fuel.

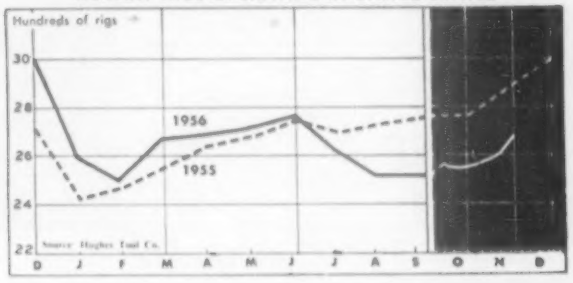
Reductions in refinery yields of residual in the Mid-Continent and North Central areas this year have tended to bring residual production and demand into balance. Any big increase in movement of heavy fuel to the Gulf Coast from refineries that normally ship to northern markets will disturb the inland-area residual balance and bring higher prices for the product.

The price-sales balance will be restored when the Group 3 price plus transportation to and storage at the Gulf Coast result in quotations for residual above the price cargo buyers are willing to pay for the product.

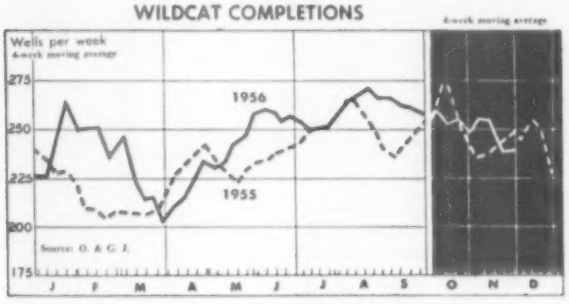
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS*

Area—	12-3-56	11-26-56	12-5-55
North Central and East	101	103	142
Southeast	41	39	33
Okla., Kans., Ark., Mo.	480	459	572
Louisiana	478	478	429
North and East Texas-Panhandle	437	409	433
Gulf and South Texas	264	260	242
West Texas-New Mexico	513	502	615
Rocky Mountain	243	243	304
Pacific Coast	117	114	145
Total United States	2,674	2,607	2,915
Western Canada	231	250	198

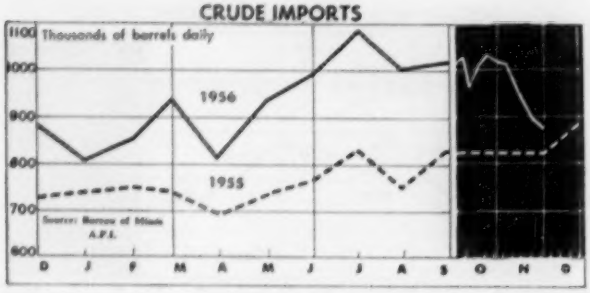
*Hughes Tool Co.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 1, 1956

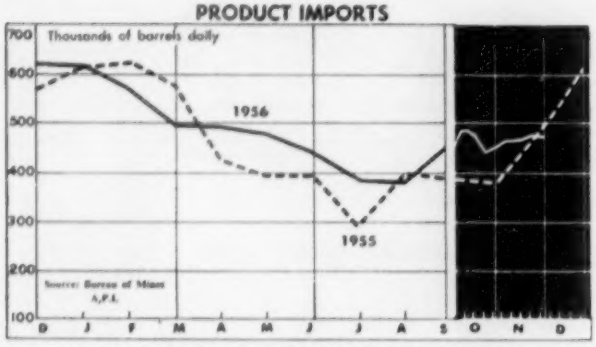
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1956				
	Comp	Oil	Gas	Dry	Footage	1956	1955	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	2	2	0	0	22,980	103	68	0	0	0	0	0	0	0	1	46	47
Arkansas	21	14	1	6	57,839	888	769	0	0	0	3	3	32	0	7	131	170
California	65	46	2	17	242,222	2,060	2,253	1	0	0	16	17	47	0	9	425	481
Colorado	13	4	0	9	65,599	1,106	1,373	0	0	0	5	5	24	0	17	561	602
Illinois	59	27	1	31	134,814	3,551	3,610	2	0	0	13	15	48	0	4	656	708
Indiana	17	5	0	†12	28,733	663	655	0	0	0	2	2	16	0	1	115	132
Kansas	93	37	6	‡50	341,444	4,544	4,628	1	0	1	20	22	114	4	40	830	988
Kentucky	38	12	5	21	46,895	1,769	1,455	0	0	0	10	10	39	0	0	364	403
Louisiana	58	32	5	21	393,739	3,488	3,748	3	1	1	5	10	110	49	56	492	707
North	32	19	1	12	123,030	1,539	1,953	1	0	0	3	4	32	2	3	204	241
South	20	12	1	7	201,932	1,565	1,795	2	1	1	1	5	63	41	39	253	396
Offshore	6	1	3	2	68,777	384		0	0	0	1	1	15	6	14	35	70
Michigan	7	4	0	3	17,741	399	487	0	0	0	2	2	9	0	2	140	151
Mississippi	8	2	0	6	52,252	403	424	0	0	0	5	5	17	1	1	181	200
Montana	6	4	0	2	24,598	430	365	0	0	0	1	1	11	0	1	153	165
Nebraska	7	2	0	5	43,414	863	819	1	0	0	3	4	37	0	1	388	426
New Mexico	41	14	15	12	185,295	1,766	1,583	2	0	0	8	10	51	1	9	195	256
Northwest	22	2	15	5	81,910	784	558	1	0	0	5	6	13	0	7	73	93
Southeast	19	12	0	7	103,385	982	1,025	1	0	0	3	4	38	1	2	122	163
North Dakota	3	2	0	1	19,822	245	238	0	0	0	1	1	8	0	0	66	74
Ohio	13	4	3	‡6	35,227	997	1,123	0	0	0	0	0	2	0	4	6	12
Oklahoma	112	61	5	§46	374,809	7,545	7,887	1	0	0	12	13	118	19	35	626	798
Pennsylvania-New York	1	0	1	0	3,328	1,042	1,386	0	0	0	0	0	0	0	14	17	31
Texas	422	249	18	155	1,757,621	19,966	18,661	9	1	4	104	118	687	32	182	4,255	5,156
Southwest (1 & 4)	53	22	4	27	220,537	2,854	2,857	0	0	1	22	23	121	6	62	812	1,001
Gulf Coast (2 & 3)	43	17	8	18	263,995	2,430	2,339	0	0	3	13	16	60	16	70	650	796
East (5 & 6)	26	13	1	12	140,814	1,053	918	0	1	0	9	10	15	3	6	370	394
N. Central (7-B & 9)	178	95	0	83	536,342	7,120	6,941	7	0	0	51	58	304	0	12	1,695	2,011
West (7-C & 8)	94	80	0	14	492,641	5,289	4,630	2	0	0	8	10	168	0	11	658	837
Panhandle (10)	28	22	5	1	103,292	1,220	976	0	0	0	1	1	19	7	21	70	117
Utah	2	1	0	1	10,571	130	81	0	0	0	1	1	1	0	5	65	81
West Virginia	9	1	6	2	30,227	642	599	0	0	0	1	1	0	0	14	10	24
Wyoming	16	7	2	7	44,031	829	830	0	0	1	4	5	17	0	11	225	253
Miscellaneous	0	0	0	0	0	71	58	0	0	0	0	0	4	0	0	60	64
Total U. S.	**1,013**	530	70	413	3,933,201	*53,500	53,100	20	2	7	216	**245**	1,402	106	414	10,007	*11,929
Total previous week	1,038	588	72	378	4,292,316			22	1	8	170	201	1,379	104	406	9,778	11,667
Total Dec. 3, 1955	1,061	601	58	402	4,246,386			24	7	4	187	222	1,507	202	317	9,350	11,376
Cumulative 1956*	53,500	28,819	3,785	20,896	214,751,459												
Western Canada	58	42	3	†13	242,398	2,991											

Service wells included: †1, ‡2, §6. *1956 actual.

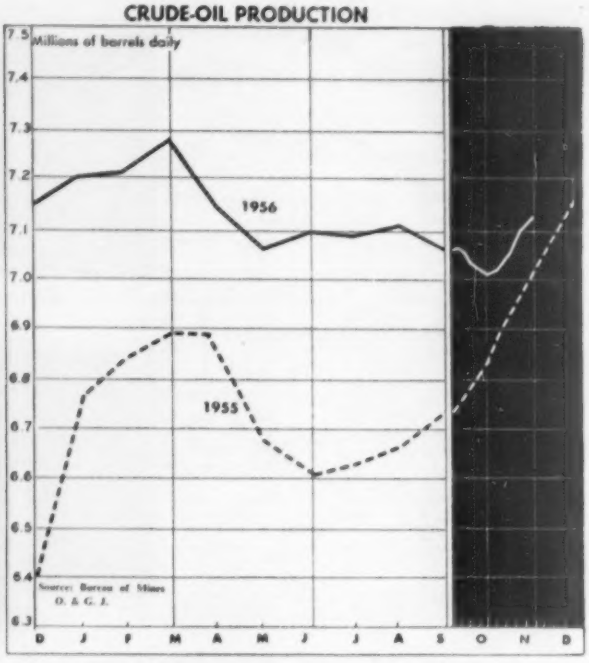
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



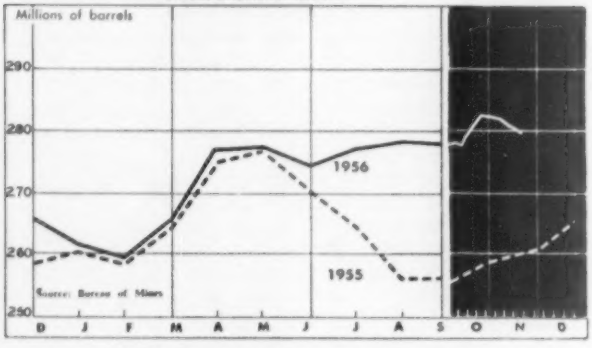
DAILY AVERAGE PRODUCTION FOR WEEK

	December 1, 1956			Nov. 24
	Crude oil	Lease condensate	Total	total
Alabama	11,200	.....	11,200	11,300
Arkansas	77,850	400	78,250	79,500
California	951,800	.....	951,800	951,300
Colorado	158,400	.....	158,400	155,800
Eastern	49,800	.....	49,800	50,200
Florida	1,275	.....	1,275	1,275
Illinois	232,900	.....	232,900	233,900
Indiana	31,700	.....	31,700	31,700
Kansas	327,500	.....	327,500	336,900
Kentucky	45,800	.....	45,800	45,200
Louisiana	777,250	66,400	843,650	843,950
North	128,600	2,400	131,000	131,300
South	648,650	64,000	712,650	712,650
Michigan	28,200	.....	28,200	28,800
Mississippi	108,950	5,000	113,950	113,950
Montana	60,400	.....	60,400	59,700
Nebraska	39,100	.....	39,100	37,900
Nevada	200	.....	200	200
New Mexico	245,425	4,200	249,625	249,525
North Dakota	37,200	.....	37,200	34,900
Oklahoma	†546,600	.....	†546,600	†600,300
Texas	2,951,600	54,500	3,006,100	3,006,100
Dist. 1	57,000	550	57,550	57,550
Dist. 2	145,000	8,600	153,600	153,600
Dist. 3	417,000	26,000	443,000	443,000
Dist. 4	226,000	6,500	232,500	232,500
Dist. 5	39,000	450	39,450	39,450
Dist. 6	124,000	6,000	130,000	130,000
East Texas field	202,600	.....	202,600	202,600
Dist. 7-B	155,000	45	155,045	155,045
Dist. 7-C	172,000	3,905	175,905	175,905
Dist. 8	1,099,000	1,600	1,100,600	1,100,600
Dist. 9	210,000	650	210,650	210,650
Dist. 10	105,000	200	105,200	105,200
Utah	8,600	.....	8,600	8,000
Wyoming	285,500	.....	285,500	293,800
Others	‡100	.....	‡100	‡100
Total U. S.	6,977,350	130,500	**7,107,850**	7,174,300
Change from previous week, down			**66,450**	
Canada	†509,200	.....	†509,200	†492,700

Total U. S. production January 1-December 1 . . §2,396,806,800 bbl.
Same period last year (crude plus cond.) . . . . . *2,270,483,832 bbl.

*Includes 37,869,500 bbl. condensate. †Week ended previous Monday. ‡South Dakota. §Revised.

CRUDE-OIL STOCKS



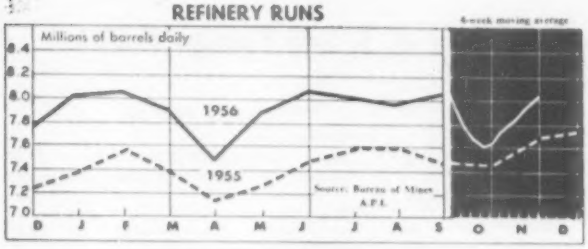
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

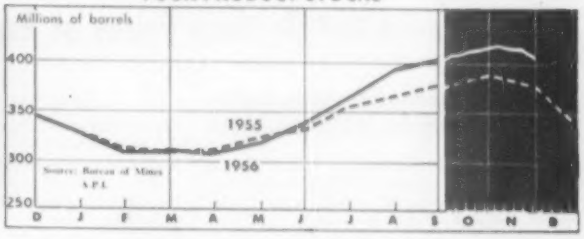
	11-24-56	11-17-56	11-26-55
Pennsylvania Grade	2,436	2,419	3,129
Other Appalachian	2,384	2,272	2,159
Illinois, Indiana, Michigan	11,760	11,568	9,716
Nebraska, North Dakota	2,347	2,518	2,079
Kansas	10,756	10,501	7,609
Oklahoma	23,830	23,907	22,205
Arkansas	2,985	2,907	2,465
Louisiana	18,312	17,626	16,745
North	2,540	2,418	2,664
South	15,772	15,208	14,081
Mississippi	3,197	3,295	2,800
New Mexico	8,373	8,535	7,435
Texas	127,299	129,524	121,176
East Texas proper	9,009	8,980	9,692
West Texas	61,339	63,032	56,756
Texas Gulf	24,253	24,293	24,288
Other Texas	32,698	33,219	30,440
Wyoming	16,864	17,111	14,923
Other Rocky Mountain	6,555	6,613	6,263
California	29,016	28,916	26,775
Foreign	†13,728	12,509	12,260
Total	279,842	280,221	257,739

*Bureau of Mines. †Includes 2,640,000 bbl. in California.

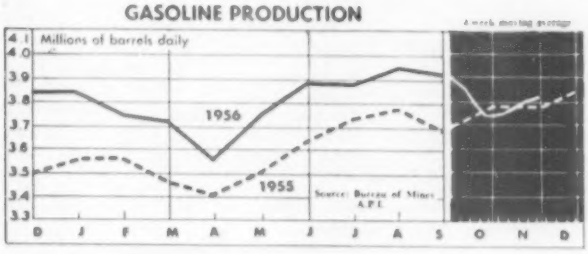
REFINERY RUNS



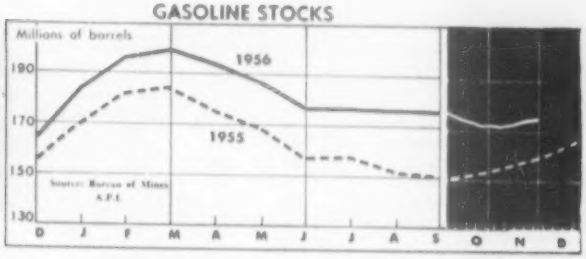
FOUR-PRODUCT STOCKS



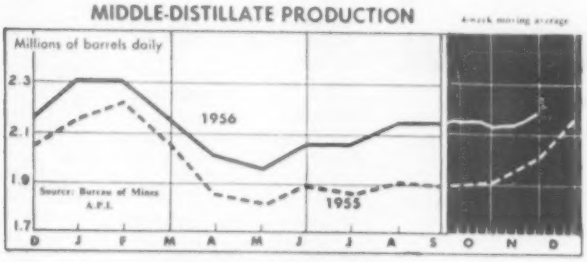
GASOLINE PRODUCTION



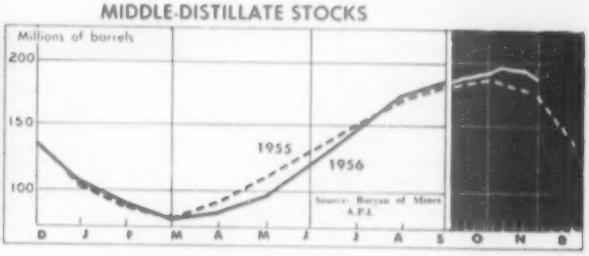
GASOLINE STOCKS



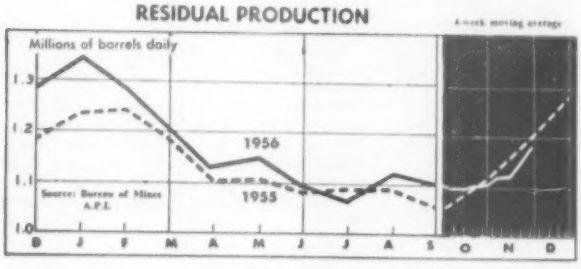
MIDDLE-DISTILLATE PRODUCTION



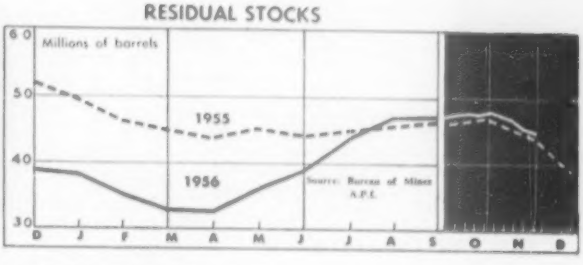
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, NOVEMBER 30, 1956

(Thousands of barrels)

District—	Daily avg. runs	Daily average production* Gaso.*	Kero.	Dist.	Resid.	Stocks† Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, November 1955 Daily avg. runs	Daily average production* Gaso.*	Kero.	Dist.	Resid.
East Coast	1,150	427.2	15.9	362.7	214.2	40,581	13,474	59,387	11,397	1,102	428.0	27.6	267.4	222.9
Appalachian:														
Dist. 1	110	42.3	5.9	27.4	8.0	4,537	672	3,503	461	112	46.1	5.5	21.1	8.2
Dist. 2	96	59.6	7.1	16.4	13.9	2,781	635	1,135	250	91	50.7	3.8	18.1	12.5
Ind., Ill., Ky.	1,442	735.7	80.7	300.0	213.9	29,759	7,561	23,975	5,856	1,375	751.2	73.3	272.1	192.8
Minn., Wis., Dak.	110	54.1	9.4	27.3	11.4	7,082	1,797	8,493	109	(§)	(§)	(§)	(§)	(§)
Okla., Kans., Mo.	692	376.3	15.9	184.3	25.3	14,788	1,861	14,024	1,517	693	406.2	17.8	162.9	34.9
Inland Texas	272	196.3	6.9	63.9	18.4	7,118	549	2,019	1,789	251	186.8	9.8	47.2	19.0
Texas Gulf Coast	1,955	883.4	116.0	505.7	247.4	25,371	3,608	14,799	6,447	1,940	907.8	137.3	481.2	255.1
La. Gulf Coast	734	379.6	53.4	190.3	54.6	11,263	2,541	7,397	1,726	688	357.8	54.8	165.3	48.1
N. La. and Ark.	104	40.7	9.7	22.1	6.1	4,354	1,130	2,098	292	97	36.7	6.4	24.9	6.7
Rocky Mountain:														
New Mexico	26	14.1	0.6	5.1	4.1	511	8	131	70	22	11.0	0.4	3.9	2.6
Other Rocky Mt.	270	132.6	5.0	65.9	34.3	5,058	400	3,142	916	256	122.8	4.3	62.0	42.3
West Coast	1,153	521.4	14.4	197.3	372.3	22,198	359	13,395	13,559	1,065	482.7		153.7	368.6
Nov. 30, 1956	8,114	3,863.3	340.9	1,968.4	1,223.9	175,401	34,595	153,498	44,389	7,692	3,787.8	341.0	1,679.8	1,213.7
Nov. 23, 1956	8,111	3,830.9	407.9	1,923.0	1,208.3	174,544	36,305	158,871	45,745					
Dec. 2, 1955	7,801	3,851.9	330.0	1,782.1	1,192.9	157,535	33,221	140,103	44,156					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines. §Included in Indiana, Illinois, Kentucky district.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (88 octane)	10.75-11.50
Premium (96 octane)	12.50-13.25
Gulf Coast (cargoes for coastwise or export movement):	
Regular (90 octane)	**11.00-11.50**
Regular (92 octane)	**11.25-11.75**
Premium (97 octane)	**12.75-13.25**
Premium (98 octane)	**13.00-13.50**
California (rack):	
Regular (84 octane)	12.35-12.6
Premium (93 octane)	13.4-13.6
Premium (96 octane)	14.6
Caribbean area (cargoes):	
Regular (87 octane)	**10.00**
Premium (93 octane)	**11.50**

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	**4.5**
Breckenridge:	
Grade 26-70	**4.0**

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16-lb. Prices for grades below 16-lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.875-10.00
Diesel oil (58 d.i. and above)	9.50-9.75
Distillate No. 1	9.50-9.75
Distillate No. 2	8.875-9.00
Gulf Coast (cargoes):	
Kerosine 41-43	9.75-10.25
Distillate No. 2	9.25-9.75
New York Harbor (barges):	
Kerosine 41-43	**11.25**
Distillate No. 2	**10.65**
Diesel fuel, 48-52 d.i.	**10.95**
Caribbean area (cargoes):	
★ Distillate No. 2	9.25

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	**6.50**
New York (export):	
126-130 A.m.p. crude scale (solid in bags or barrels)	**7.35**

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max. 1% S)	$2.30-2.50
Gulf Coast (cargoes):	
Bunker C fuel	$2.35-2.60
New York Harbor (barges):	
Bunker C fuel	$3.05
Caribbean (cargoes):	
Bunker C	$2.35
California (rack):	
Bunker C fuel, Los Angeles	$2.50

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	24
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.75
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	27
200 vis. neutral (180 at 100°), 25 p.t.	25

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	★ Wyo. (sour)
14-14.9	$2.42				
15-15.9	2.46				$1.93
16-16.9	2.49				1.97
17-17.9	2.53				2.01
18-18.9	2.57				2.05
19-19.9	2.60				2.09
20-20.9	2.64	$2.50		$2.37	2.13
21-21.9	2.68	2.52		2.39	2.17
22-22.9	2.72	2.54		2.41	2.21
23-23.9	2.76	2.56		2.43	2.25
24-24.9	2.80	2.58	$3.01	2.45	2.28
25-25.9	2.84	2.60	3.03	2.47	2.31
26-26.9	2.88	2.62	3.05	2.49	2.34
27-27.9	2.92	2.64	3.07	2.51	2.37
28-28.9	2.97	2.66	3.09	2.53	2.40
29-29.9	3.02	2.68	3.11	2.55	2.43
30-30.9	3.07	2.70	3.13	2.57	2.46
31-31.9	3.13	2.72		2.59	2.49
32-32.9	3.19	2.74		2.61	2.52
33-33.9	3.25	2.76		2.63	2.55
34-34.9	3.31	2.78		2.65	2.58
35-35.9	3.36	2.80		2.67	2.61
36-36.9	3.40	2.82		2.69	2.64
37-37.9	3.43	2.84		2.71	2.66
38-38.9		2.86		2.73	2.68
39-39.9		2.88		2.75	2.70
40 and up		2.90		2.77	2.72

*Includes Oklahoma, Kansas, North Dakota, West Texas (sweet), North Central Texas, North Louisiana, Arkansas. †Low-cold Texas, North Louisiana, Arkansas. †Low-cold-test Gulf. ‡Sour.

Effective dates: California, November 19, 1956; east of California, June 15, 1953; Pennsylvania Grade, August 16, 1956.

Some crudes in North Central Texas, West Central Texas, and Texas Panhandle have been shifted to the intermediate schedule with $2.83 for 40° and 2 cents per degree drop. Effective dates range from July 15, 1956, to August 10, 1956.

FLAT PRICES

Louisiana:	
Cotton Valley (distillate)	$3.0
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	4.68
Middle District	4.50
Southwest Pennsylvania	4.21
West Virginia	4.03
Buckeye Grade	4.07
Zanesville Grade	3.15
Illinois Basin	2.90
Canada:	
Leduc-Woodbend (flat prices D-2, D-3)	2.60
Redwater (Alta.) D-3	2.49
Smiley-Viking (Sask.)	2.26
Pembina	2.52

FOREIGN

Venezuela:	
Cumarebo, 48°-49.8°, Tucupido	*3.4(
San Joaquin, 41°-41.9°, Puerto La Cruz	*3.04
Oficina, 35°-35.9°, Puerto La Cruz	*2.80
Tia Juana medium, 26.5°-26.9°, Amuay§	†2.30
Quiriquire, 16.5°-16.9°, Caripito	‡2.35
Lagunillas heavy, flat, Amuay or Las Piedras§	2.20
Bachaquero, 16.5°-16.9°, Amuay or Las Piedras§	‡2.05

*Plus or minus 2 cents per barrel for each degree gravity change. †Plus or minus 2.5 cents per barrel for each half-degree gravity change. ‡Plus or minus 3.5 cents per barrel for each half-degree gravity change. §Also available at La Salina at 3.0 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	**$1.97**
Iranian, 34.0°-34.9°, Bandar Mashur	**1.91**
Iranian, 34.0°-34.9°, Abadan	**1.86**
Iraq, 36.0°-36.9°, Fao	**1.87**
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	**1.72**
Qatar, 39.0°-39.9°, Umm Said	**2.06**
Middle East, E. Mediterranean:	
★ Arabian, 36.0°-36.9°, Sidon	2.69
★ Iraq, 36.0-36.9°, Tripoli, Banias	2.69
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°-38°	2.6(

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

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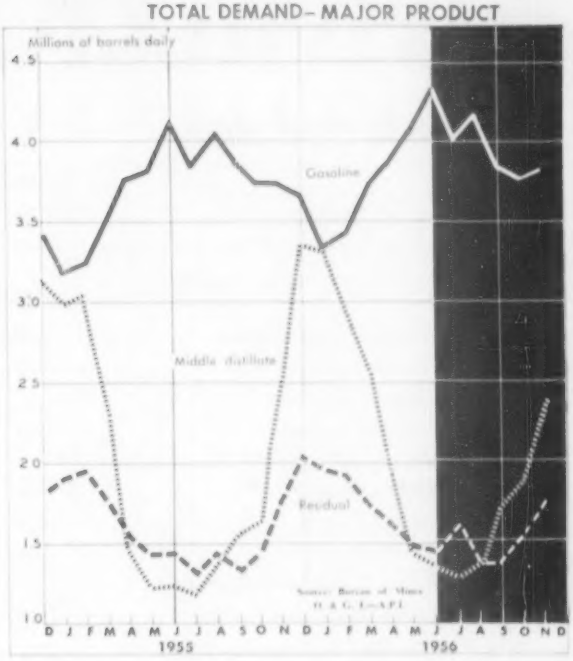
SUPPLY AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

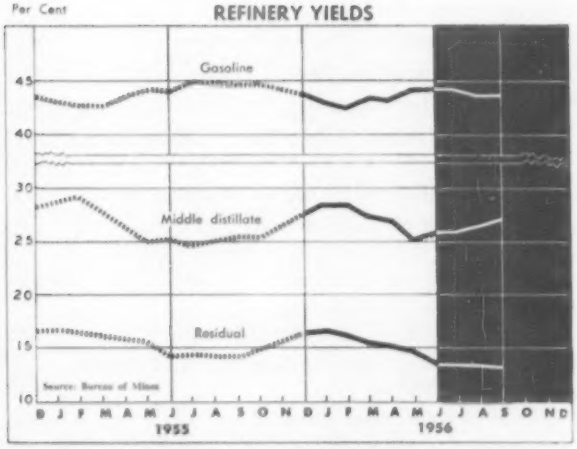
	Total demand	Refinery production	Stocks end of period†
GASOLINE			
November 1956*	3,835	3,822	175,400
October 1956*	3,781	3,744	172,400
September 1956	3,860	3,902	177,974
December 1955	3,679	3,846	165,433
November 1955	3,726	3,788	157,871
KEROSINE			
November 1956*	390	376	34,600
October 1956*	313	357	35,000
September 1956	274	329	33,588
December 1955	605	395	26,770
November 1955	455	341	33,283
DISTILLATE			
November 1956*	2,004	1,819	153,500
October 1956*	1,563	1,779	158,300
September 1956	1,447	1,845	150,411
December 1955	2,768	1,765	111,333
November 1955	2,047	1,680	141,808
RESIDUAL			
November 1956*	1,746	1,181	44,400
October 1956*	1,528	1,106	48,000
September 1956	1,384	1,062	47,342
December 1955	2,036	1,286	39,174
November 1955	1,773	1,214	44,071

*Preliminary. †Thousands of barrels.

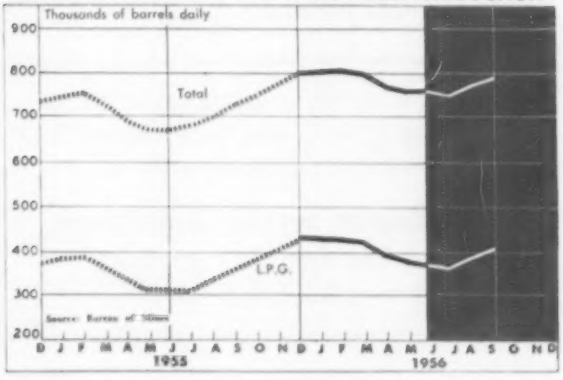
TOTAL DEMAND–MAJOR PRODUCT



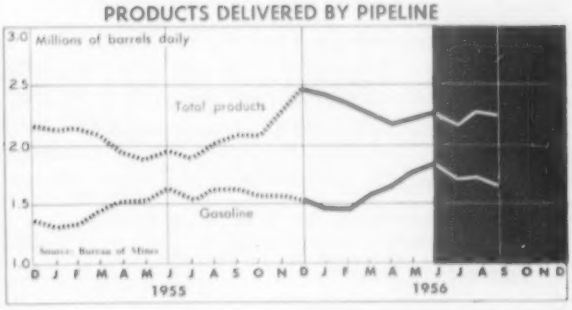
REFINERY YIELDS



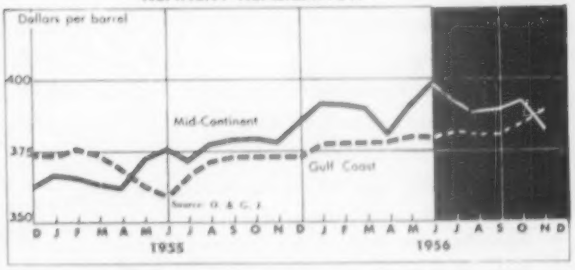
NATURAL-GASOLINE AND CYCLING PLANT PRODUCTION



PRODUCTS DELIVERED BY PIPELINE



REFINERY REALIZATION



REFINERY REALIZATION

	Nov.* 1956	Oct.* 1956	Sept. 1956	Nov. 1955
Mid-Continent	$3.82	$3.93	$3.88	$3.78
Gulf Coast	3.89	3.88	3.78	3.73

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel oil, and residual as published in The Oil and Gas Journal.

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GEOLOGIST, 3½ years, exploration, development experience. Desire employment with progressive firm as exploration geologist. Will relocate for right firm. Box J-837, The Oil and Gas Journal, Tulsa, Oklahoma.

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FOR SALE: Oil and gas leases and drilling blocks. Write Harvey Daugherty, Horse Branch, Ky.

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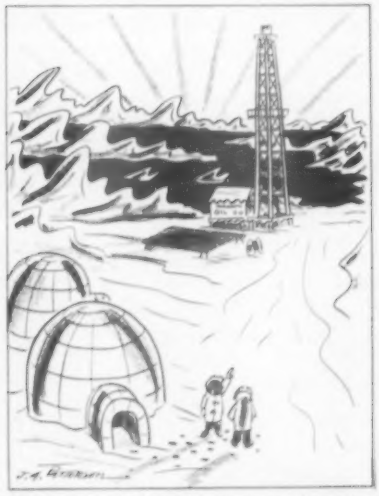

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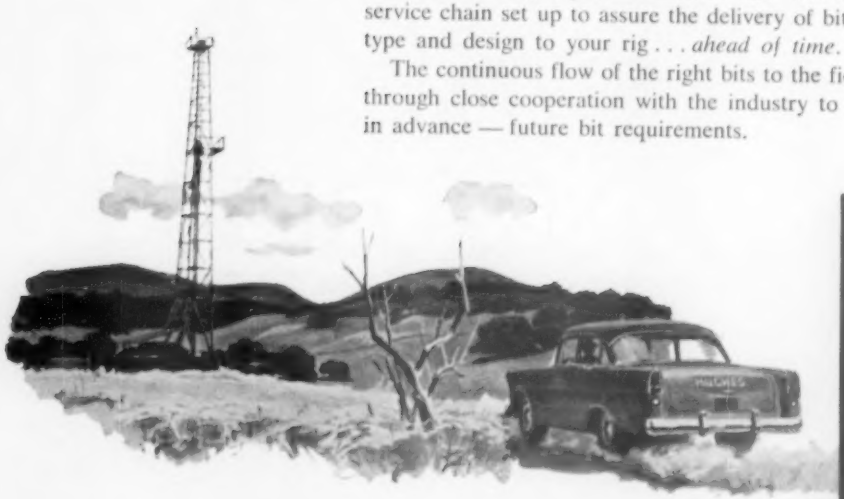
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